OVERSIGHT ON THE FEDERAL AVIATION ADMINISTRATION FISCAL YEAR 1985 RESEARCH, ENGINEERING AND DEVELOPMENT BUDGET REQUEST

HEARINGS

BEFORE THE

SUBCOMMITTEE ON TRANSPORTATION, AVIATION AND MATERIALS

OF THE

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OVERSIGHT ON THE FEDERAL AVIATION ADMINISTRATION FISCAL YEAR 1985 RESEARCH, ENGINEERING, AND DEVELOPMENT BUDGET REQUEST

MONDAY, MARCH 26, 1984

HOUSE OF REPRESENTATIVES,
COMMITTEE ON SCIENCE AND TECHNOLOGY,
SUBCOMMITTEE ON TRANSPORTATION,
AVIATION AND MATERIALS,
Washington, D.C.

The subcommittee met, pursuant to call, at 1:30 p.m., in room 2318, Rayburn House Office Building, Hon. Dan Glickman (chairman of the subcommittee) presiding.

Mr. GLICKMAN. Good afternoon. The irony of calling a hearing on FAA's programs, and particularly the air traffic control system, when the chairman of the subcommittee was held up because of air traffic delays in St. Louis is very much apparent to me this morning, and I think reinforces the need for responsible and expeditious movement to modernize the system.

Before I begin, I would like to recognize Admiral Engen, who is here in the committee room today, who is the Administrator-designate of the FAA, and we look forward to his early resolution of all matters relating to his appointment so he can get on board as quickly as possible.

Today the Subcommittee on Transportation, Aviation and Materials will begin three days of hearings on the FAA's fiscal year 1985 budget request for research, engineering, and development.

As the subcommittee with jurisdiction over FAA research and development, we have a responsibility to review these programs, and to do all that we can to assure that the program to modernize the air traffic control system remains on schedule. This front end research and development is essential for that schedule to be met.

The National Airspace System Plan, and particularly the computer acquisition under that plan, represents a massive procurement of a unique and highly complex system. Several contracts have been awarded already, and more are planned for the near future. During our hearings, we will receive a status report from the FAA on the national airspace system plan and also hear from the aviation industry on their progress working with the FAA on these important projects.

With such a massive undertaking as the National Airspace System Plan, acquisition strategy and program management will

obviously be key to its success. In that regard, the subcommittee is particularly interested in reviewing the status of the Systems Engineering Integration [SEI] contract to oversee implementation of the National Airspace System Plan. We are pleased that the SEI contractor has been selected and are interested in hearing more details of their plan to assure that various elements of the development and system installation of the National Airspace System Plan are designed to bring the system together in an efficient and timely fashion.

The subcommittee is also particularly interested in the advanced automation system which will be at the heart of the modernized air traffic control system. We intend to consider that matter in detail as well.

Now, I am pleased to welcome to the committee a frequent visitor, Al Albrecht, Associate Administrator for development and logistics, and Al, why don't you go ahead and proceed? I know that we have Mr. Frank Frisbie and Mr. Val Hunt with us today and I think you have an exceptional statement. You may summarize it or read it. The entire statement will appear in the record.

STATEMENT OF ALBERT P. ALBRECHT, ASSOCIATE ADMINISTRATOR FOR DEVELOPMENT AND LOGISTICS, ACCOMPANIED BY FRANK L. FRISBIE, DEPUTY ASSOCIATE ADMINISTRATOR FOR DEVELOPMENT AND LOGISTICS, AND VAL HUNT, DIRECTOR OF ADVANCED AUTOMATION PROGRAM OFFICE, FEDERAL AVIATION ADMINISTRATION

Mr. ALBRECHT. Thank you, Mr. Chairman.

Sorry about St. Louis.

As always, it is a pleasure to appear before the subcommittee and to report on the status of the national airspace system plan and our research engineering and development programs. Overall, the programs are moving well, and I believe you will be pleased with our progress.

Mr. Chairman, the purpose of my statement is to address the question of FAA management of the national airspace system plan together with some comments on F&E carryover. I will be brief and would appreciate your allowing me to present the statement in its entirety.

I have brought just about the entire front line of our management team along today. Let me introduce them. At the table with me are Frank Frisbie, my Deputy and our national airspace system plan program manager; he will be presenting the national airspace system plan status and an overview of the system engineering and integration contract today and the status of our RE&D programs on Wednesday.

Mr. Val Hunt, the Director of the Advanced Automation Program Office, will be reviewing the advanced automation program for you later on this afternoon.

Seated behind me are Neal Blake, my Deputy for Engineering and our weather program manager. He will run through the weather and aircraft safety programs on Wednesday.

Next, we have Marty Pozesky, the Director of our Program Engineering and Maintenance Service, who will assist us in answering your questions.

And finally, I would introduce you to Lee Page, who played a major role structuring the system engineering and integration contract and is Acting Director of the Systems Engineering Service.

All of these people, and a lot more I left at home, worked directly on the development of the national airspace system plan, which was developed and produced in-house by the FAA. You have in place, the core of this country's air traffic control and air navigation expertise, and I firmly believe that the United States is by far the world's center of expertise in those matters.

Overall, we are on schedule, and given your support in fiscal year 1985, I expect to report next year that virtually all of the major programs will be underway.

To carry out a task of the size of the national airspace system plan requires, in addition to expertise and dedication, an organization configured to cope with it. Coincident with completion of the plan, the various engineering functions of the FAA were reorganized into a single entity which provides for continuity of all national airspace system plan programs from cradle to grave; concept development to decommissioning. We have provided for a strong systems engineering focus, the groups of our technical talents to see a project through development, production, and installation, and a viable test and evaluation environment. The organization is in place and functioning well. The key people have 2 years solid progress in implementing the national airspace system plan programs, and as you will hear from Frank, Val, and Neal, the results are becoming very evident.

A new Administrator has been nominated who possesses an outstanding combination of management and technical skills, together with experience and insight into the aviation community. We have the leadership, the talent, and the organization to effectively manage the national airspace system plan implementation.

We need help, however, in the very large task of detailed system engineering and integration of all the national airspace system plan programs. To this end, we wrote a very thorough request for proposals for the system engineering and integration contractor, went out into the private sector, and selected a top of the line organization—Martin Marietta will furnish additional capabilities the program needs, and together with FAA, will form a dedicated engineering and management team. The ADL organization currently is, and will continue to be, the focus for the development and implementation of the policies and managerial decisions relating to the implementation of the national airspace system plan.

We have the full support of the other elements within FAA and support from the Office of the Secretary. To date, the Congress has been a strong, supportive participant in bringing the national airspace system plan into being. Our report today should reassure you that we are continuing to carry out the plan we have presented to you.

I would now like to take a few minutes to acquaint you will some facts relating to the funding of the F&E program. The interest in F&E funding, which is tied closely to the RE&D program you au-

thorize, has risen appreciably since the levels have increased to fund the national airspace system plan. I will use a few vugraphs to explain the process, and the annual carryover which seems to trouble people.

Mr. GLICKMAN. This is a little magic which is new.

Mr. ALBRECHT. We are impressed, Mr. Chairman.

As the vugraph notes, F&E funds have been appropriated in the same manner for quite a while. The changes over the years have been in the type and time of expiration of funds. We have had no-year money, 3-year money, and currently we have 5-year money. In all cases, the funds provided were to execute a complete project.

The boxes at the bottom of the vugraph have been expanded to ortray a sense of what portion of the funds for a given project are spent in the 5 years of a normal project implementation life. Year A, the first year, the percentage of funds obligated for equipment procurement will be in the 35 to 45 percent range of the total funds required, and we are constantly striving to increase that percentage.

The year B, will run in the 30 to 35 percent range.

Year C will vary from 10 to 25 percent, and is primarily impacted by provisioning spare parts associated with the earlier equipment buy.

Years D and E are primarily associated with regional activities, site preparation, commissions, and will account for 12 to 20 percent of the project's cost.

This table is to further illustrate the overall division of an F&E appropriation into an obligation profile. The vertical box shows the distribution of the fiscal year 1994 appropriations into the years they will be obligated. The A, B, C, D, and E from the previous vugraph.

The horizontal box portrays the elements that make up the fiscal year 1984 obligation goal, $549 million. It is composed of A, B, C, D, and E's of the funding from fiscal year 1980 through fiscal year 1984. That is a first year of 1984 funding; the second year of 1983 funding; the third year of 1982 funding; the fourth of 1981; and the fifth of 1980.

As a level of the appropriated funds rises, so do the unobligated balances, based upon the national airspace system plan funding profile. The obligated balance should peak in fiscal year 1987 and start down. This process has distinct advantages. The prime one is that we, OST, OMB, and the Congress review a given program or a given segment once. We don't need to track, justify and handle funding for a 5-year program five times instead of just one. That is a major blessing. The Congress has been handling this account since the fifties in this manner and we believe it is the best and most efficient way to proceed.

Understanding the process may help to defuse a concern for unobligated balances which are really money earmarked and reserved for implementation costs beyond the first year's obligation for each program.

A related item of interest is the ending uncommitted balance in the trust fund. In fiscal year 1983, it was $1.9 billion. fiscal year 1984 it is projected to be $2.9 billion. And the good news is that it

will decrease to $1.4 billion in 1985 and current projections show a dropping to $600 million in 1987.

Are there any questions on this, Mr. Chairman?

Mr. GLICKMAN. Not so far.

Mr. ALBRECHT. I would like now to turn the microphone over to Frank Frisbie, who will provide an overview of the national airspace system plan systems engineering and integration contract.

Mr. FRISBIE. Thank you, Al.

Mr. Chairman, it is a pleasure to appear before you to talk about a plan which is well underway and I think in general, proceeding very well.

Going back to what the plan is. As you know, it is a comprehensive plan for modernization and improving air traffic control and airway facilities through the year 2000. It was first published in December 1981, was updated in April 1983, and we are presently working on the April 1984 version, which is in the final executive branch coordination.

The plan is directly linked to the funding authorizations in the Airport and Airway Improvement Act of 1982. The basic premise of the national airspace system plan was and is to realize gains in safety, capacity, productivity and economy by replacing older vacuum tube technology equipment and by higher levels of automation, consolidations of major facilities, the application of new and lower cost technologies in telecommunications.

In updating the plan in 1984, we strove to achieve these bullets that are indicated here. We have a plan which changes over time but has not changed very much, and I will be talking about the changes that we have made since last year.

We try to insure consistency with the other agency documentation such as national airspace review and rotorcraft master plan. We have a great deal of participation in drafting these plans within the FAA and also with Department of Defense and OST and OMB. We want to incorporate changes in forecast demand. As I will show later there has been change in the forecast demand.

We want to maintain our expenditures within the available funding. We want to live up to every bit of that authorization, but we don't want to go over it. We adjust the projects to reflect agency decisions. I will be going over some of those. There are no major changes to the plan this year.

Then to document those changes in project direction and schedules, again there were no significant changes in project direction. There were some schedule adjustments. They were for the most part adjustments of a few months. Then to recompute the cost implication of change.

Let me go directly to the changes. There are 88 projects in the national airspace system plan for 1984. I identified that there are six projects which have expanded and I won't go through those in detail, Mr. Chairman, but those are projects that were in the book before that were not singled out for special treatment. We have now identified those as particular projects. They are combining radar approach control into ARTCC's, weather communications processer, central repair facilties, and at this point, I would like to note that we have changed the title of one of the chapters in the book. It was formerly called Auxiliary Systems. We now call it

Maintenance and Operation Support Systems, to better reflect the contents of that chapter.

Maintenance control centers has been added as a specific project and aircraft and related equipment, which is the avionics component to equip the flight inspection aircraft, has been added, and finally we have added a particular project to identify that the systems engineering and integration contractor is now selected and on board.

Three projects were subdivided. Those seemed significant enough to stand alone this year. An example of that is that we had a project last year to relocate the national airspace system plan and we have broken that up into two functional elements, consolidated Notam System and replace the Weather Switching Center.

We have completed one project. In last year's version we thought we would need a stand alone facility for the traffic management system automation. We have now placed that facility at the Technical Center in existing space, so it is that stand-alone facility that is no longer required.

We have combined one project, that was to move two EARTS related software enhancements into a single project. We have moved some projects hopefully to make the book more readable and we changed content in 27 projects, and we did add one project which had to do with supplemental navigation system monitors.

And it is also true, as I said before, that as a result of the change in the 10-year aviation forecast, the NAS plan benefits are lower then were predicted last year. That is to say the cost avoidance is slightly less this year. It is $0.6 billion less over the 20 year period, because of lower activity forecasts between 1990 and the year 2000.

There are 88 projects in the plan. Here I am talking about the 63 major projects. The other 23 do not involve major acquisition. Those have to do with regional activities, continuing programs and so forth.

Of the 63 involving major acquisitions, by the end of fiscal year 1984 we will be under contract for 65 percent or 41 of those 63.

By the end of fiscal year 1984 we will be under contract for 84 percent or 53 of the 65.

Now, there are some caveats to that. We will need the Congress to continue to approve and appropriate the funds that are indicated in the plan and we have assumed that on multiyear contracts we will go ahead and we planned them.

I think this gives you some sense of the momentum that we are building up.

Mr. GLICKMAN. Could you put the previous vugraph on there? Is that basically on track in terms of where you perceived you needed to be last year at this time?

Mr. FRISBIE. Yes sir, Mr. Chairman, I think it is. In fact, I think many folks would have said we were optimistic to assume that we would be this far along and we are quite pleased with where we are.

Mr. GLICKMAN. Thank you.

Mr. FRISBIE. This is another indicator of that same kind of progress, and here I am not using the term committed as an accountant would, but rather to say that these projects for which these dollars are earmarked, are already underway. That is to say,

underway at the end of fiscal year 1984 and at the end of fiscal year 1985. You will see that 75 percent of the $9.1 billion, that excludes the $2.3 billion for recurring kind of projects, will be committed by the end of fiscal year 1984, and likewise, 84 percent will be committed by the end of 1985, using the same provisos as I did before.

Here we have tried to give you a list of the status of some of the major programs. You will see there have been quite a few milestones achieved. The Host computer is on competition, June of 1985. The advanced automation system, MLS and so forth. We could add to that our expectation that the RML replacement will be awarded this year; radio control equipment will be awarded in fiscal year 1985; center weather processing contract in 1984; and so forth. We still have a number of milestones to go but we are moving right along.

Just perhaps to identify some of the funding profiles that I think you know, Mr. Chairman, better than I do. The first thing that I needed to remind myself was that the legislation does not provide for the accumulation of funds during the 5-year period in the R&D, so if we are cutting this appropriations that money is gone.

We went through a reduction process in both fiscal years 1983 and 1984, and with some jiggering and stetching we have managed to keep the critical NAS plan jobs underway. With requirements for advanced automation program accounting for 57 percent of our fiscal year 1985 request, there isn't much room to accommodate any reductions. Based on your previous support, I recognize this is like talking to the choir, but it is important that we keep this funding profile up.

Our requests in fiscal years 1986 and 1987 are the fully authorized levels. The F&E plan is essentially on target with the authorized level. Since F&E is cumulative, we have adjusted to accommodate the reductions in fiscal year 1983 and fiscal year 1984. Two hundred and fifty million dollars, which was cut last year has been added to fiscal year 1985. The other reductions have been added and spread through 1986–88.

As we stated last year when the F&E request was reduced $250 million by the Senate, we proceeded with the procurements related to the $250 million and will be ready to award them right after the beginning of the fiscal year. Our 1985 request includes that $250 million and we must have it if we are going to stay on schedule.

Mr. GLICKMAN. OK; let me ask this request now, as long as I have these numbers here. As you know, a program freeze idea is floating around Congress in connection with fiscal year 1985 budget across the board. I wonder, since I have those numbers here, I wonder, Al, you or whomever would want to discuss what program freezes would mean in terms of specific numbers and then maybe we can talk more about what it would mean in terms of programing?

Mr. ALBRECHT. Well, Mr. Chairman, let me start. If by a freeze we mean that the fiscal year 1984 number becomes $750 million plus perhaps some little allowance for inflation, that would be a drastic cut in the program. In terms of impact——

Mr. GLICKMAN. Why would it be $752 million?

Mr. ALBRECHT. Seven hundred fifty was the fiscal year 1984. I meant $750 million.

Mr. GLICKMAN. Seven hundred fifty?

Mr. ALBRECHT. That is right. And that represents not quite a billion dollar reduction in what we feel we need.

Now, we would certainly have to take a serious look at the full funding program we use and the risk there, of course, is if we get off of full funding that initial procurements of each program might not be supported in future years.

Now, the other choice, of course, is to delay in starting acquisition of programs that we have targeted for fiscal year 1985, in this case, Mr. Frisbie's 84 percent number of the major programs committed through 1985, we would have a very difficult time bringing over. More likely I think we would come back and consider the request to the Congress to use the carryover resulting from full funding of almost a billion dollars in the trust fund to award the programs as planned.

Now, there is a risk here, of course, because in succeeding years, if the appropriations aren't available to provide for installation and spares and provisioning and all the other things for those programs, then we would have to pile them in warehouses.

Mr. GLICKMAN. What you say is conceivably you would take the trust fund balance and just use it to fund the deficiency between the numbers that you project in 1985 and what the 1984 level freeze would be?

Mr. ALBRECHT. We would have to request permission to do that. That is one of the say, three options we would have. None of the above are very heartening but that is one we would look at.

Mr. GLICKMAN. What were the other two options?

Mr. ALBRECHT. The other two were to delay starting acquisition of the programs and really my first suggestion is back to full funding, to forego the full funding philosophy recognizing the implication that places on later projections. Are there really two choices?

Mr. GLICKMAN. OK.

Mr. FRISBIE. Now, if you will, Mr. Chairman, I would like to turn to the systems engineering integration contract.

As Al indicated, we awarded the contract on January 31, 1984 for $684 million over a 10-year period to support FAA and national airspace system plan implementation. There is a 10-year period for performance, 5 years in the basic contract, plus options for 3 years and 2 years respectively to add to 10 years. It is a cost plus award fee with fee awarded every 6 months, based on SEI performance and achievement of the national airspace system plan programs and objectives.

I am technical officer for the SEI contract and the fee determining official. Mr. Lee Page is my alternate and his organization provides staff support.

This, Mr. Chairman, is our attempt to graphically indicate what area of Mr. Albrecht's ADL organization that SEI contract supports. There has been, I think, some misunderstanding that the SEI supports all of those activities. As you will see, the SEI support focuses around the national airspace system plan and the F&E portion of the budget. It does not involve the other appropriations and

the other responsibilities of Mr. Albrecht except where they impinge on the national airspace system plan.

Mr. Chairman, this is a very busy slide, but it identifies the contractual activities that Martin Marietta will be concerned with. The WBS numbers you will see WBS No. 5.0 at the bottom of this long rectangular here, are the contractual paragraphs that refer, and you will see that there is an element, that is to say, Martin Marietta's internal management, one for national airspace system plan planning with WBS No. 6.0 wherein they will be performing a critical and technical audit of the current national airspace system plan to identify any areas of risk in schedules, technology and costs and thereafter to support FAA in the annual updates of the national airspace system plan.

No. 7.0 is national airspace system plan's programing management. They will assist FAA in its overall management of the national airspace system plan modernization program. This includes activities to develop acquisition strategies for national airspace system plan and analysis of alternative technical approaches considering cost schedules and risk.

National airspace system plan program control tools, WBS No. 8.0. They will develop and implement and operate a configuration management system and self-management information and planning tools to support top management decisions.

Program execution, or national airspace system plan system level engineering and integration, WBS No. 9.0. They will develop a detailed system design to ensure that the national airspace system plan objectives are met and proper systems and subsystems the technical activity and interfaces are specified. They will also prepare national airspace system plan's integration plans, test plans, for system and subsystems integration tests performance validation.

And in project management, that is national airspace system plan's program support and execution, WBS No. 10.0, they will do a variety of jobs at the individual project level. I will mention some of those on a subsequent slide. You can see they will have very far-reaching impact on the national airspace system plan and our management of it, Mr. Chairman.

Our intent was and is to form a team and Martin Marietta is organizing its air traffic control division to provide counterpart managers to those in our organization.

I will have a mirror image in Fred Udoff, who is program manager and vice president at Martin Marietta, Marty Pozesky, will have one with John McCorkle, director of project management and so forth. This arrangement is facilitating a lot of one-on-one and we think it is helping us to get off to a speedy start. Let me at least identify for you some of the acronyms on that chart. I am ADL 2. This EIPD program director is Fred Udoff. Going down to AES, that is our systems engineering organization, Martin counterpart is Steve Copps, systems engineering and design.

APM, program engineering and maintenance, Martin Pozesky on our side, John McCorkle on project management for Martin Marietta. Ed Koenke heads up our technical center, SEI counter is Paul Brown, whose organization is called integration and installation tests.

Of course, Val Hunt heads up our advanced automation program office, and his counterpart is Brian Ethridge.

We gathered the national airspace system plan projects into three categories, as shown here, those whose design was not firm where SEI will play a major role, those where the designs were specified, only a little limited possibility for change, and those projects which were in production and some interim projects.

There are 24 projects in group 1. SEI's role there is the full range. Project planning, system acquisition, technical monitoring, technical support, technical direction, and IV&V.

In group 2 there are 15 projects. SEI's role is technical monitoring and support.

And in group 3, there are 42 projects where the SEI role is technical monitoring alone.

As I said, Mr. Chairman, we think of this as a teaming arrangement. We have arrayed what we think that the FAA brings to the table in our contract with Congress. Our technical and management people, our program management abilities, our F&E. We will be doing all the contracting, that is, Government contracting, and system implementation and acceptance. It is another way of saying we have the final responsibility.

The SEI contractor is bringing a lot to the table. Obviously they have a contract with FAA. They will be bringing about 1,000 technical and management people giving us management support, planning support, helping us with the overall system design, technical support to program managers. I have listed their independent verification and validation, and technical direction, and let me say with respect to technical direction that in technical direction we do not have the authority to change the scope, the scheme or the cost of any of our contracts.

And finally, system integration planning and support. This chart which has been called a haystack chart, is to give you some sense of the man loading by those statement of work or work breakdown structure elements which I had before. The sum is something on the order of 7,500 labor years over the 10-year period, distributed as I have shown. In the peak year it is about 1,000 people.

Martin has already started, obviously. Their initial areas of concentration are those I have outlined here. They will, as I say, be conducting an audit of the national airspace system plan that is due 6 months after contract award, so we will have it early this summer.

They are installing and initializing program control tools on their computer for the use by FAA. They will be completing the level-1 design and that is an FAA furnished draft of year 2000 system architecture, due 14 months after award. They will be initiating the level-2 design, which is the system topology, which identifies the quantity, location, their performance management, and data and voice loading.

And they have already started giving us program support. They are working on software, independent verification and validation for Mr. Hunt's office. They are providing architect and engineering services for center building expansion, and they are helping us in the flight service automation.

That, Mr. Chairman, is what I intended to say. I would like to hand it over to Mr. Val Hunt, if you have no questions.

Mr. HUNT. Good afternoon. I am happy to be here this afternoon addressing this subcommittee. I am going to spend a few minutes describing the structure of the advanced automation program and then I will report on the progress we have made to date.

Now, the early planning approach considered many options in what the best way might be to replace the computers that are in the system today, and the final choice of approach is to first install new Host computers using the old national airspace system plan software to give us an early capacity improvement and to avoid saturation of the computers at some of the enroute centers.

Second, to introduce a new sector suite using the Host computer and the national airspace system plan software again but with new software added to handle flight data processing.

Then, third, to introduce the remaining elements of the advanced automation system which would include an entirely new computing capability, a local area network, and a number of other improvements.

These are major steps, and in order to allow the users of the system to become accustomed to it, to allow the initial transients to damp out, we have allocated at least 2 years between each of these three major steps.

Our objectives for this program are to begin installation of new computers in the enroute centers by 1986; to then begin to install the functional enhancements that are needed to improve productivity of our air traffic controllers.

In 1990 we expect to have our first site operational on the new sector suites, and beginning in 1992 we should have the advanced automation system installed at its first site and we can then begin to add higher levels of automation.

This is based upon the idea of consolidation of the TRACON's into area of controlled facilities so all of the major air traffic control facilities are at a single site.

Now, the procurement strategy is to have two major procurements, one for the Host and one for the advanced automation system. Based on the idea of maximizing competition, where it is practicable to do so, but maintaining a prudent risk management approach, and we have the constraint of needing a computer that has a compatible instruction set for the Host and the early capacity improvement for the advanced automation system will have full competition.

Looking now at the Host computer program, the plan is to competitively award two contracts for the design for demonstration and full evaluation test at the FAA technical center of rehosted software on a modern instruction compatible computer, and then to have the competition contractors submit proposals for the full system and acquisition. One of those two would then be selected for that acquisition contract.

The design competition is scheduled to be completed in 21 months and we think about 3 years are needed for the full deployment of the Host computer system. The scope of work there is to provide operational systems at all existing 20 ARTCC's, Host; the national airspace system plan software with the absolute minimum

changes; to maintain the standard commercial 360/370 instruction set; to provide a system support facility at the technical center; to provide a training system at the academy; and to provide a fully integrated logistic support system.

Now, last September 22, contracts were awarded to IBM and the Sperry Corp. for the design competition phase. They have presented their designs and the designs have been reviewed and completed in February. The next major step is to locate the computer systems at the technical center and the facilities there are ready for occupancy anytime after the first of May. The plan is for the installation of computers to begin in June and for testing to get underway in October.

Now, we have shown here the major milestone schedule for the Host system, and as you can see, the blackened triangles indicate milestones already achieved.

Turning to the advanced automation system, once again we have adopted a competitive strategy here to make sure that we get the best ideas from industry. There would be two contracts awarded that would extend through the completion of design and ending with the critical design review. Then, based upon full technical cost and management proposals, one of those two contractors would be selected for full system acquisition. We think that design contracts will last about 3 years and the acquisition phase should take about 6 years.

The scope of work here is to provide a clean sheet design, that is starting with a set of functional requirements to design and develop a totally new traffic control computer system and to include both enroute and terminal functions in the same system. We would provide new sector suites, workstations for the controllers. We would provide a new distributed computing network and totally new software.

One of the major aspects of the program will be the transition from where we are now to the full advanced automation system, and for that we envision a four-stage transition which we have described in a top-of-the-haystack-type document.

We would provide an integrated facility where we would have all of the en route and other systems that will comprise the ACF. Document training and integrated logistics would be provided and this contract is based on the first year of contractor maintenance after operational deployment for both hardware and software systems.

All area control facilities would have an advanced automation system and currently we plan for 23 sites and the contractors would be responsible for site adaptation and preparation for full system operation.

Now, the DCP proposals were received on October 24. The selection process is well underway and is running completely on schedule at this time. We expect contracts to be awarded in August of this year.

We have established FAA transition planning teams. They have delivered their preliminary report and we expect their final report in April.

We have also developed a joint team of air traffic controllers and personnel from the program office to address the issue of how best to use the new tools that the advanced automation system will

present to the air traffic controller. They have delivered three major reports, one describing the function of today's system; one describing the function of tomorrow's system; and a special document for their new work station. And we have established monitoring teams for the two anticipated contractors.

The milestone schedule shows that the RFP's have been received and that the contract awards are planned to be made in August.

Now, in our approach to program management, the advanced automation program was designated a major system acquisition using the Department of Defense's A-109 guidelines for major system acquisition methodology, and we have applied the methods for managing and controlling that have been evolved and developed by both national airspace system plan and Department of Defense. Our emphasis here is on a total life cycle management approach wherein life cycle cost is one of the major planning elements.

As you have heard earlier this afternoon, the system engineering and integration contractor has established a programing segment for the advanced automation program. Their scope of work will be to assume full engineering support for the program office to provide IV&V services for the advanced automation system to provide program management support and technical direction of the AAS prime contractors.

The IV&V support, I am happy to say, has gotten off to a flying start. We have had a team working for about 7 weeks. They have presented their initial plan to the program office. It has been approved and they are now working on more detailed planning and they are planning to staff up and be available to begin monitoring contractor activities by the time the contracts are awarded this March.

Engineering support is at a low level now because we currently have an engineering support contractor on board, RCA, and transition to RCA will be made in a more gradual manner to allow plenty of time for the transition to occur in an orderly manner.

The program management support issue is being worked on at this time. There again, we have an incumbent providing support tools to us and they are in contact with the SEI contractor.

As I say, technical direction will begin on the advanced automation system, along with critical design review time. Now, the significant activities planned for 1985 are to complete the Host design competition phase; to complete the testing at the center; to award the acquisition phase contract; and to complete the SEI contractor phase-in.

We expect to complete construction at the first site to receive a new Host computer system and we expect to have the system definition phase of the design completed by the advanced automation system contractors. We would then complete the system requirements review and begin the AAS system design.

Finally, we expect to complete the sector suite mockups in 1985. So, as you can see, both the Host and the AAS programs are well underway and are on schedule and that fiscal year 1985 is a key year for both programs.

The SEI contractor is on board and is beginning our support and I would just like to comment, Mr. Chairman, our currently planned funding profile for this program is adequate, but that any stretch-

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outs we might incur in future years would probably have a serious impact on the schedule of the contracts.

Thank you.

Mr. ALBRECHT. That completes our formal presentation. We are ready for whatever questions you might have.

[The prepared statement of Mr. Albrecht, plus vugraphs, follow:]

PRESENTATION TO THE COMMITTEE ON SCIENCE AND TECHNOLOGY, SUBCOMMITTEE ON TRANSPORTATION, AVIATION, AND MATERIALS, BY ALBERT P. ALBRECHT, ASSOCIATE ADMINISTRATOR FOR DEVELOPMENT AND LOGISTICS, FEDERAL AVIATION ADMINISTRATION, CONCERNING THE STATUS OF THE NATIONAL AIRSPACE SYSTEM PLAN AND THE RESEARCH ENGINEERING AND DEVELOPMENT PROGRAMS, MARCH 26 AND 28, 1984

Thank you Mr. Chairman. As always, it is a pleasure to appear before the Subcommittee and to report on the status of the National Airspace System (NAS) Plan and our Research Engineering and Development (RE&D) Programs. Overall, the programs are moving well, and I believe you will be pleased with our progress.

Mr. Chairman, the purpose of my statement is to address the question of FAA management of the NAS Plan together with some comments on F&E carryover. I will be brief and would appreciate your allowing me to present the statement in its entirety.

I have brought just about the entire front line of our management team along today. Let me introduce them. At the table with me are Frank Frisbie, my Deputy and our NAS Plan Program Manager; he will be presenting the NAS Plan status and an overview of the System Engineering and Integration Contract today and the status of our RE&D programs on Wednesday. Mr. Val Hunt, the Director of the Advanced Automation Program Office, will be reviewing the Advanced Automation Program for you later on this afternoon. Seated behind me are Neal Blake, my Deputy for Engineering and our Weather Program Manager. He will run through the Weather and Aircraft Safety Programs on Wednesday. Next, we have Marty Pozesky, the Director of our Program Engineering and Maintenance Service, who will assist us in answering your questions. And finally, I would

like to introduce you to Lee Page who played a major role structuring the System Engineering and Integration Contract and who is Acting Director of the Systems Engineering Service.

All of these people, and a lot more I left at home, worked directly on the development of the NAS Plan, which was developed and produced in-house by the FAA. You have in place, the core of this country's air traffic control and air navigation engineering expertise, and I firmly believe that the United States is by far the world's center of expertise in those matters.

Overall, we are on schedule, and given your support in FY-1985, I expect to report next year that virtually all of the major programs will be underway.

To carry out a task of the size of the NAS Plan requires, in addition to expertise and dedication, an organization configured to cope with it. Coincident with completion of the Plan, the various engineering functions of the FAA were reorganized into a single entity which provides for continuity of all NAS Plan programs from cradle-to-grave; concept development to decommissioning. We have provided for a strong systems engineering focus, the grouping of our technical talents to see a project through development, production, and installation, and a viable test and evaluation environment. The organization is in place and functioning well. The key people have 2 years solid progress in implementing the NAS Plan programs; and, as you will hear from Frank, Val, and Neal, the results are becoming very evident.

A new Administrator has been nominated who possesses an outstanding combination of management and technical skills, together with experience and insight into

the aviation community. We have the leadership, the talent, and the organization to effectively manage the NAS Plan implementation. We need help, however, in the very large task of detailed system engineering and integration of all the NAS Plan programs. To this end, we wrote a very thorough Request for Proposals for a System Engineering and Integration Contractor, went out into the private sector, and selected a top of the line organization, Martin Marietta, to provide us the help we need. That solicitation was a very thorough and complete effort, as I am sure they will attest. Martin Marietta will furnish the additional capabilities the program needs and, together with the FAA, will form a dedicated engineering and management team. The ADL organization currently is, and will continue to be, the focus for the development and implementation of the policies and managerial decisions relating to the implementation of the NAS Plan.

We have the full support of the other elements within FAA and support from the Office of the Secretary.

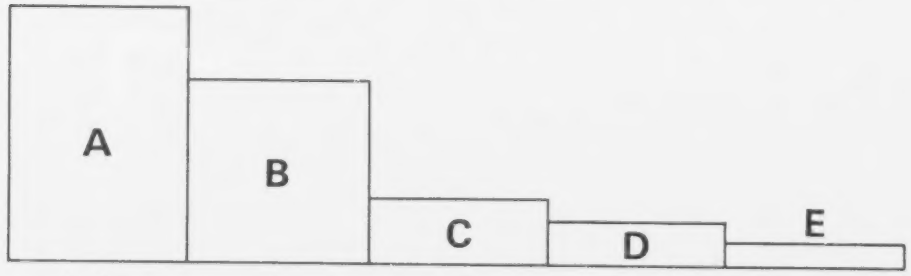
To date, the Congress has been a strong supportive participant in bringing the NAS Plan into being. Our report today should reassure you that we are continuing to carry out the Plan we have presented to you.

I would now like to take a few minutes to acquaint you with some facts relating to the funding of the F&E program. The interest in F&E funding, which is tied closely to the R,E&D Program you authorized, has risen appreciably since the levels have increased to fund the NAS Plan. I will use a few viewgraphs to explain the process, and the annual carryover which seems to trouble some people.

F&E Funding Process

F&E Funding Process

- Since the 1950's, Congress Has Appropriated F&E Funds in a Manner That Initially Provides the Resources to Execute the Complete Project.
- Normally, the Largest Percentage of the Funds Appropriated for a Project, Equipment Procurement, Is Obligated in the Year of Appropriation.
- Funds for Non-First Year Items Are Reserved for Activities Such as Site Selection, Land Acquisition, Construction, Provisions, Freight, Flight Inspection, Etc., to Complete Project. The Timing for These Obligations Is Dictated by the Normal Flow of Project Activities.
- Profile of F&E Obligations for Typical F&E Projects and the Items They Are Related to Are as Follows:



1st Year Obligation	2nd Year Obligation	3rd Year Obligation	4th Year Obligation	5th Year Obligation
– Major Hardware Costs	– Test Equip. – Ancilliary Subsystem Procurement	– Regional Site Engrg. – Provisioning – Regional Drafting, Site Prep. & Install.	– Freight – Regional Site Preparation, Installation, Construction, Flight Check, & Commission	– Freight – Regional Site Preparation, Installation, Construction, Flight Check, & Commission

F&E Obligations

Fiscal Year	FY 79	FY 80	FY 81	FY 82	FY 83	FY 84	FY 85	FY 86	FY 87	FY 88	Total Oblig
1983											Actual
1984						A					549
1985						B					971
1986						C					1,269
1987						D					1,398
1988						E					1,405
Appropriation					625	750	1,657	1,509	1,449		

F&E Obligation Process

Advantages:

- Current Process Highly Acceptable to FAA and Congress
- Process Is Supported by OMB and GAO
- Congress Reviews Project/Program Once—Requires Total Cost Presentations
- Enables Efficient and Effective Program Management—The Total Program Is Funded at One Time

NAS Plan

Overview

NAS Plan Overview

- A Comprehensive Plan for Modernizing and Improving Air Traffic Control and Airway Facilities Services Through the Year 2000

- First Published in December 1981
  - — Updated in April 1983 and
  - — Now in April 1984

- Plan Is Directly Linked to the Funding Authorizations in the Airport and Airway Improvement Act of 1982

NAS Plan Overview

Recurring Theme

Gains in Safety, Capacity, Productivity, and Economy Will Chiefly Be Realized by:

- Higher Levels of Automation
- Consolidations of Major Facilities
- Application of New and Lower Cost Technologies in Telecommunications

NAS Plan Overview

Objectives of 1984 Update

- Maintain Consistency With Previous Editions
- Ensure Consistency With Other Agency Documentation
- Incorporate Changes in Forecast Demand
- Maintain Expenditures Within Available Funding
- Adjust Projects to Reflect Agency Decisions
- Document Changes in Project Direction and Schedules
- Recompute Cost Implications of Change

NAS Plan Overview

Summary of 1983 to 1984 Changes

- Schedules Adjusted as Required for All Projects
- Completed Milestones Shown Darkened
- Minor Editorial Changes to Many Project Descriptions
- 6 Projects Expanded
  3 Projects Subdivided
- 1 Project Completed and Removed
  1 Project Consolidated
- 4 Projects Relocated
- 27 Projects Changed in Content
- Benefits Lower $21.5B to $19.9B—Lower Activity Forecasts

NAS Plan Overview

Contract Status

65% or 41 of 63 Major Projects Will Be Under Contract by the End of FY 1984

84% or 53 of 63 Major Projects Will Be Under Contract by the End of FY 1985

Note: Allows Ongoing Design Competitions to Proceed as Planned Into Production and Considers the Few Instances Where Recompetition Will Be Required as Continuations of the Initial Contract.

NAS Plan Overview

Financial Status

75% of $9.1 $\bar{B}$[1] Committed by End of FY 1984

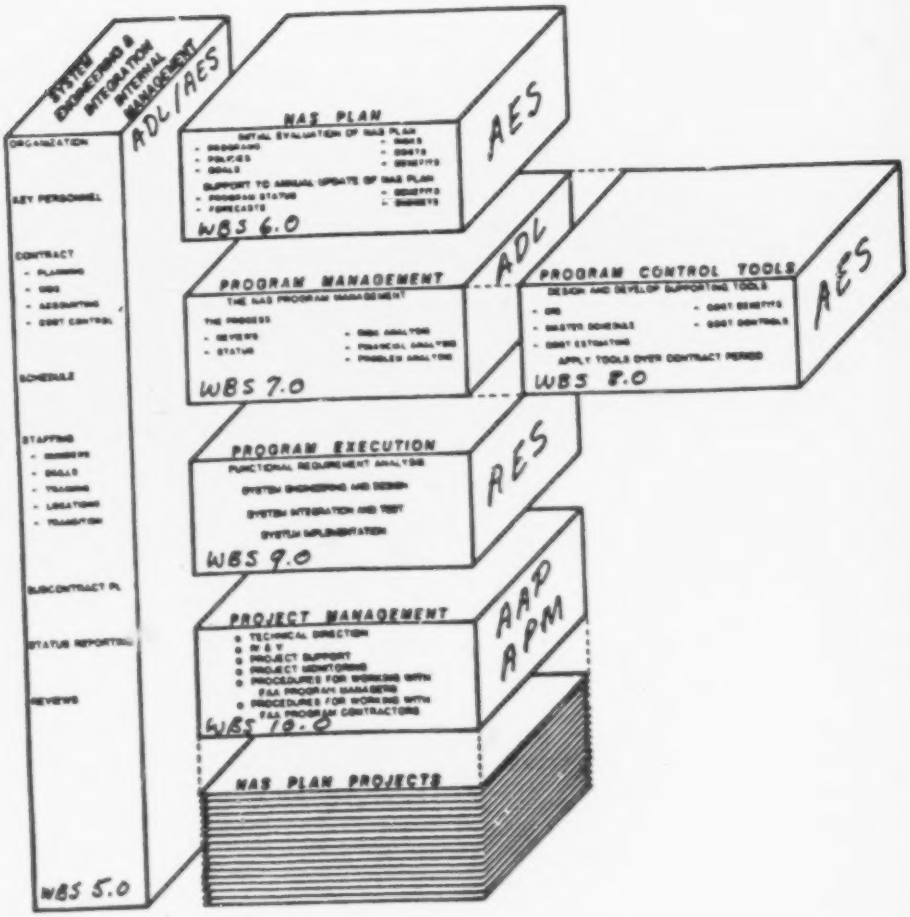
84% of $9.1 $\bar{B}$[1] Committed by End of FY 1985

Based Upon Contractual Obligations and the Commitment of the Resources Required to Bring the Equipment or Systems to Commissioning. Also Allows for Ongoing Design Competitions to Proceed as Planned Into Production and to Commissioning.

[1] Does Not Include $2.3 $\bar{B}$ of Annual Recurring (Regional Managed Routine) Programs

Subject to Congressional Approval and Appropriations of Authorized Levels

THE OVERALL REQUIREMENT--SEI CONTRACT



NAS Plan Overview

Major Program Status

HOST	Complete Design Competition—6/85 Award Production Contract—6/85
AAS	Award Design Competition Contract—8/84
MLS	Production Contract Awarded—1/84
MODE S	Award Production Contract—5/84
ASR-9	Production Contract Awarded—9/83
NEXRAD	Validation Phase Contract Awarded—6/83 Limited Production Award—9/86
AWOS	Demo Units Installed--7/83; Complete Demo—6/84; Award Production Contract—1/85
VSCS	Specification Completed—3/84 Development Contract Award—9/85

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RE&D & F&E Out-Year Plan Financial Profiles

Research, Engineering, and Development

($ In Millions)

	FY-82	FY-83	FY-84	FY-85	FY-86	FY-87	FY-88
Legislation	104.8	133.5	286.0	269.0	215.0	193.0	N/A
Approp/Request	79.8*	117.8*	263.5	269.0	215.0	193.0	181.0
ATC	46.5	49.2	67.3	69.7	62.8	104.8	101.4
AAP	11.2	39.5	147.1	152.8	106.8	21.4	23.6
NAV	8.2	5.0	8.7	6.8	5.6	5.9	6.4
WX	4.8	8.1	16.3	16.7	16.7	37.1	23.5
Av. Med.	2.9	3.1	4.4	5.5	5.8	6.0	6.3
A/C Safety	5.2	11.4	17.8	14.7	14.7	15.0	16.7
Environ.	1.0	1.5	1.9	2.8	2.6	2.8	3.1
Total	79.8*	117.8*	263.5	269.0	215.0	193.0	181.0

* Excludes FE&D/F&E

Facilities and Equipment

($ In Millions)

	FY-82	FY-83	FY-84	FY-85	FY-86	FY-87	FY-88
Legislation	261.0	725.0	1,393.0	1,407.0	1,377.0	1,164.0	N/A
Approp/Request	260.8	625.0	750.0	1,657.0	1,509.0	1,449.0	1,308.0
En Route ATC		85.5	106.2	529.1	573.7	677.1	637.2
Terminal ATC		129.5	327.4	637.3	384.0	203.3	196.3
FSS		113.2	94.9	150.9	107.9	61.4	41.2
Air Navigation		112.9	83.1	120.8	189.3	234.1	219.7
Util/Misc.		79.0	90.2	193.8	227.9	248.0	188.3
D, T&E		22.0	23.8	10.1	11.3	9.5	9.0
Aircraft		82.9	24.4	15.0	14.9	15.6	16.3

(Cumulative Through FY-87-$6,327.0)

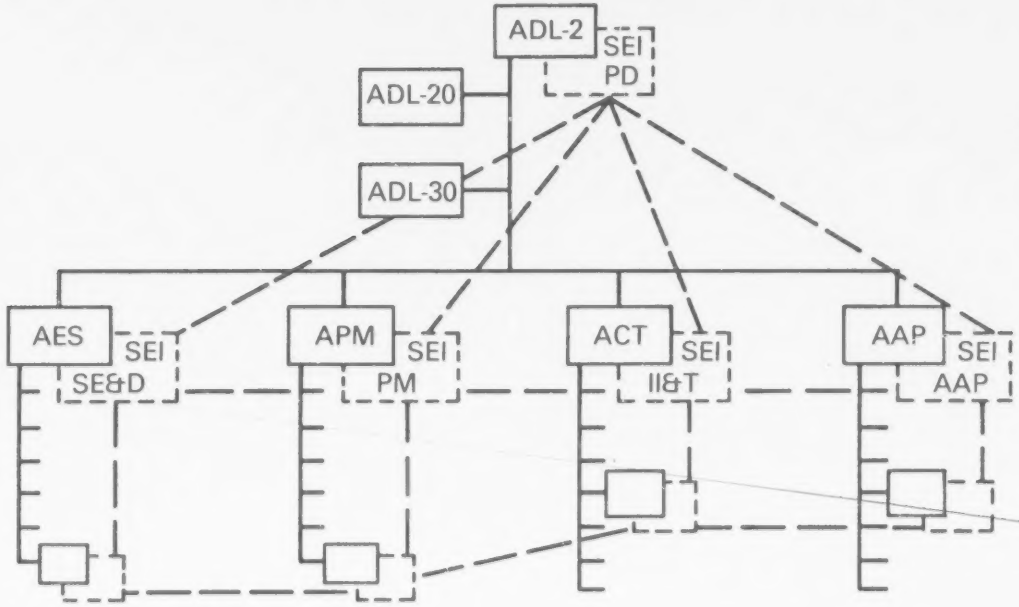
Systems Engineering and Integration Contract Overview

System Engineering and Integration Contract

- Awarded January 31, 1984, to Martin-Marietta
- Supports FAA in NAS Plan Implementation
- 10-Year Period of Performance
- Cost-Plus-Award Fee
  - Fee Awarded Each 6 Months
  - Based on SEI Performance and Achievement of NAS Plan Programs/Objectives
- ADL-2 Is Technical Officer for SEI Contract
  - AES-1 Is Alternate and Provides ADL-2 Staff Support

Martin Marietta, Air Traffic Control Division

FAA/SEI Organizational Interface



The NAS Plan Projects

- Project Categories

  Group I — Design Not Yet Firm—SEI Has Major Role

  Group II — Designs Specified—Only Limited Possibility for Change

  Group III — Projects in Production and Interim Projects

- Span the Period 1983-1994

Teaming Agreement

FAA and SEI Contractor to Implement National Airspace System Plan

FAA

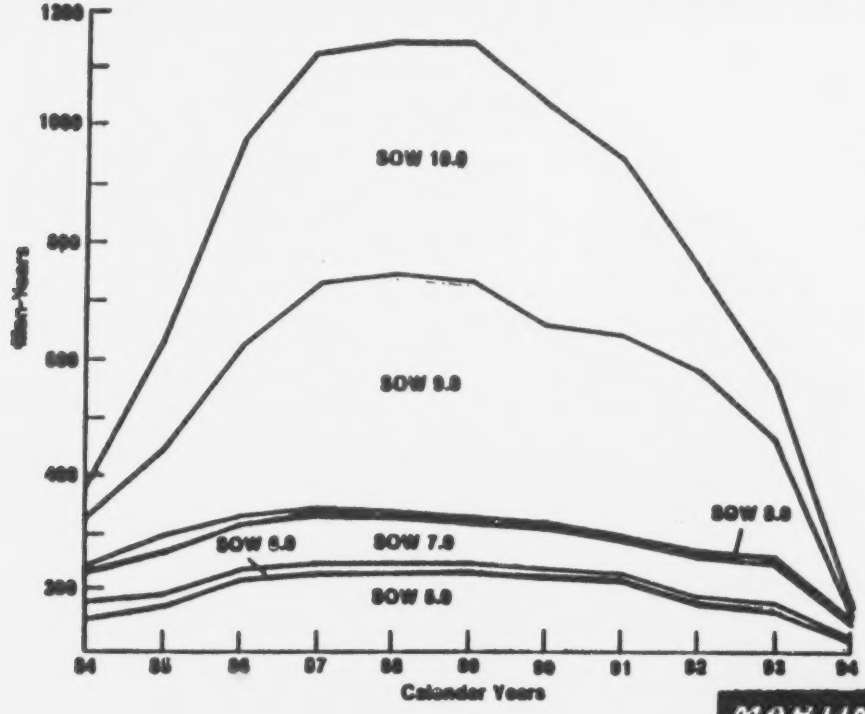
- "Contract" With Congress
- 1500 Technical/Management People
- Program Management
- F&E & RE&D Program Planning
- Contracting
- System Implementation/Acceptance

SEI Contractor

- Contract With FAA
- 1000 Technical/Management People
- Management Support
- Planning Support
  - — Computers
  - — Program Control Tools
  - — Management Analysis
- Overall System Design
- Technical Support to Program Managers
  - — IV & V
  - — Technical Direction
- System Integration Planning/Support

Martin Marietta, Air Traffic Control Division

Manloading by SOW



Initial Areas of Concentration

- Conduct "Audit" of NAS Plan
- Install and Initialize Program Control Tools on SEI Computer
- Complete Level I Design
- Initiate Level II
  - — Interfacility Communications
  - — Automation
  - — Weather Data Distribution
- Program Support
  - — Software IV&V for Advanced Automation Program
  - — A&E for Center Building Expansion
  - — FSAS, NADIN, ASR-9, . . .

ADVANCED AUTOMATION PROGRAM

REPORT TO CONGRESS

MARCH 26, 1984

SELECTED APPROACH

- TO REALIZE EARLY GAINS AND REDUCE OVERALL PROGRAM RISK, ADOPT A PHASED INTRODUCTION OF NEW SYSTEMS ELEMENTS INTO OPERATIONAL SITES:
  - FIRST, INSTALL NEW HOST COMPUTER, USING OLD NAS SOFTWARE
  - SECOND, INTRODUCE NEW SECTOR SUITE, USING HOST COMPUTER, NAS SOFTWARE, WITH SOME NEW SOFTWARE
  - THIRD, INTRODUCE THE REMAINING NEW SYSTEM ELEMENTS, INCLUDING NEW SOFTWARE
  - TO PERMIT THE SYSTEM TO STABILIZE, ALLOW TWO YEARS BETWEEN EACH OF THESE THREE STEPS
- THIS APPROACH NOW AN INTEGRAL PART OF NAS PLAN

OBJECTIVES

- START OF INSTALLATION OF NEW COMPUTERS IN ENROUTE CENTERS BY 1986
- NEAR TERM ENROUTE FUNCTIONAL ENHANCEMENTS- 1986-1987
- NEW SECTOR SUITE OPERATION BEGINNING IN 1990
- HIGHER LEVELS OF ATC AUTOMATION AT AREA CONTROL FACILITIES BY 1992 (AERA-1) AND CONTINUING THROUGHOUT THE 1990's (AERA-2 & -3)
- CONSOLIDATION OF TRACONS THRU AREA CONTROL-FACILITIES CONCEPT

SELECTED PROCUREMENT STRATEGY

- TWO MAJOR PROCUREMENTS :
  - HOST
  - AAS
- BASED ON :
  - MAXIMUM PRACTICAL COMPETITION
  - PRUDENT RISK MANAGEMENT
  - HOST SELECTION CONSTRAINED BY COMPATIBLE INSTRUCTION SET REQUIREMENT
  - EARLY CAPACITY IMPROVEMENT THRU HOST STRATEGY
  - FULL COMPETITION FOR AAS

HOST PROCUREMENT STRATEGY

- COMPETITIVELY AWARD TWO CONTRACTS FOR DESIGN, DEMONSTRATION AND FULL EVALUATION TEST AT FAA TECHNICAL CENTER OF REHOSTED NAS SOFTWARE ON A MODERN INSTRUCTION - COMPATIBLE COMPUTER

- BASED ON TECHNICAL, MANAGEMENT AND COST PROPOSALS, SELECT ONE OF THE TWO DESIGN COMPETITION CONTRACTORS FOR FULL SYSTEM ACQUISITION

- DURATION OF DESIGN COMPETITION CONTRACTS - 21 MONTHS

- DURATION OF ACQUISITION CONTRACT — APPROXIMATELY THREE YEARS

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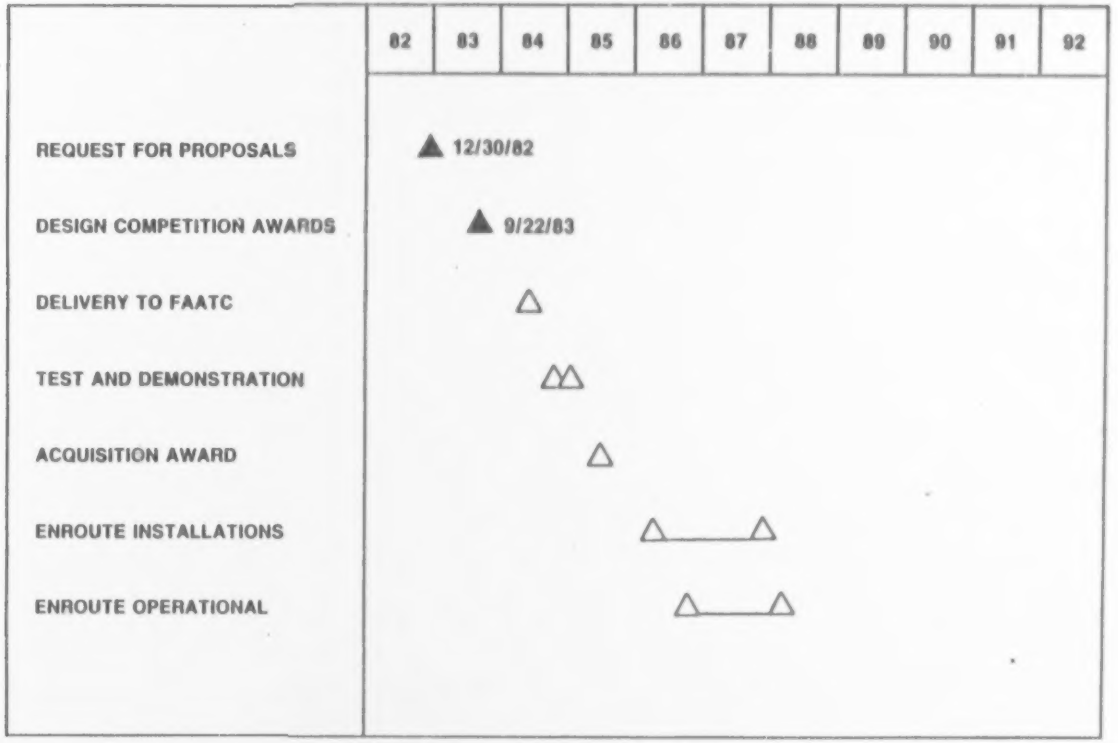
HOST ACQUISITION SCOPE OF WORK

- PROVIDE OPERATIONAL SYSTEMS AT 20 ARTCCs
- REHOST NAS SOFTWARE WITH ABSOLUTE MINIMUM NUMBER OF SOFTWARE CHANGES
- MAINTAIN STANDARD 360/370 INSTRUCTION SET HARDWARE/SOFTWARE INTERFACE
- PROVIDE SYSTEM SUPPORT FACILITY AT FAATC
- PROVIDE TRAINING SYSTEM AT FAA ACADEMY
- PROVIDE FULLY INTEGRATED LOGISTIC SUPPORT SYSTEM, INCLUDING DOCUMENTATION AND TRAINING

HOST SYSTEM ACCOMPLISHMENTS

- COMPETITIVE CONTRACTS AWARDED SEPTEMBER 22, 1983
- DESIGN REVIEWS COMPLETED FEBRUARY 1984
- COMPUTER TEST SITES AT FAA TECHNICAL CENTER COMPLETED, READY FOR OCCUPANCY
- COMPUTER INSTALLATIONS THERE JUNE 1984
- BOTH CONTRACTORS ARE MAKING SATISFACTORY PROGRESS

HOST COMPUTER SYSTEM SCHEDULE



AAS PROCUREMENT STRATEGY

- COMPETITIVELY AWARD TWO CONTRACTS FOR SYSTEM DESIGN AND DEMONSTRATION OF SECTOR SUITE, CONSOLE PROTOTYPES
- COMPETITIVE CONTRACTS WILL EXTEND THROUGH COMPLETION OF DESIGN, INCLUDING CRITICAL DESIGN REVIEW
- BASED ON FULL TECHNICAL, MANAGEMENT AND COST PROPOSALS, SELECT ONE OF THE TWO DESIGN COMPETITION CONTRACTORS FOR FULL SYSTEM ACQUISITION
- ESTIMATED DURATION OF DESIGN CONTRACTS — 3 YEARS
- ESTIMATED DURATION OF ACQUISITION CONTRACT -- 6 YEARS

ADVANCED AUTOMATION SYSTEM (AAS) SCOPE OF WORK

- PERFORM A "CLEAN SHEET" DESIGN OF A NEW SYSTEM TO MEET THE REQUIREMENTS OF THE 1990's. INCLUDE BOTH ENROUTE AND TERMINAL FUNCTIONS
- PROVIDE:
  - NEW SECTOR SUITES
  - NEW MODERN DISTRIBUTED COMPUTING NETWORK
  - NEW SOFTWARE
- PROVIDE A PHASED TRANSITION FROM THE REHOSTED NAS TO THE FULL AAS
- PROVIDE A SYSTEM SUPPORT FACILITY INTEGRATED WITH OTHER NASP FACILITIES

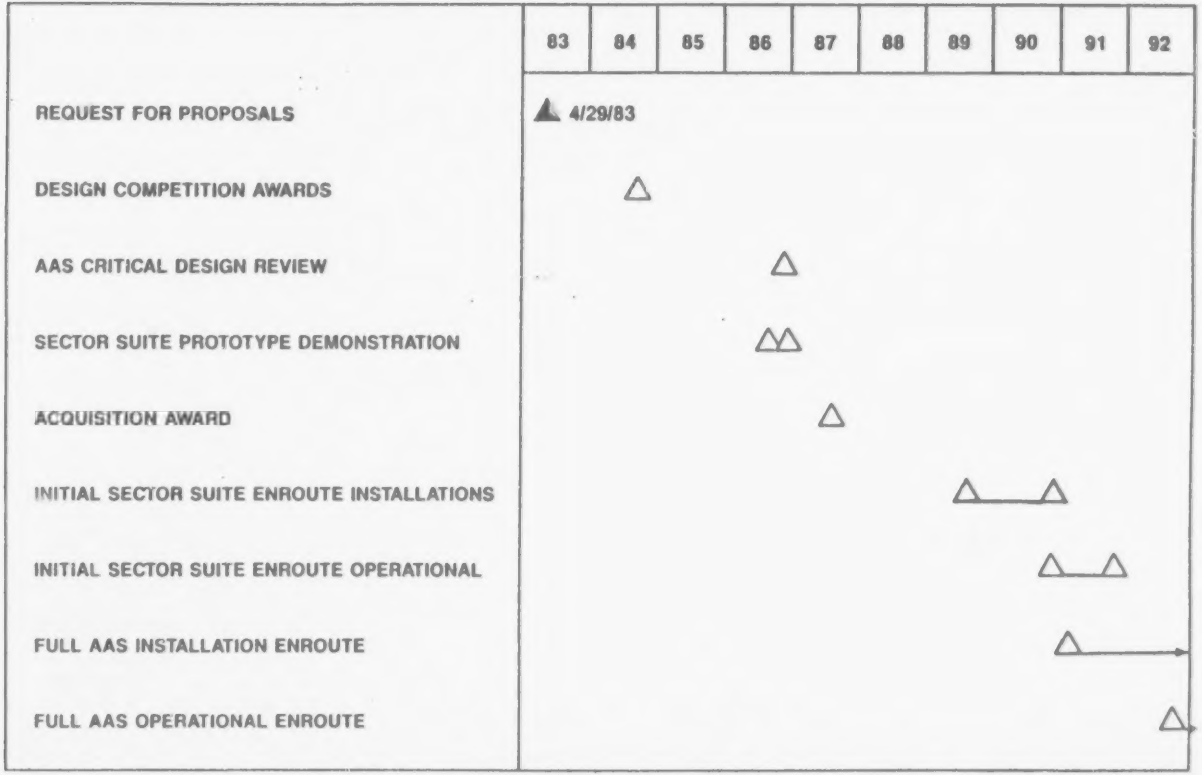
ADVANCED AUTOMATION SYSTEM (AAS)
SCOPE OF WORK (CONT.)

- PROVIDE DOCUMENTATION, TRAINING AND AN INTEGRATED LOGISTICS SYSTEM PROGRAM
- PROVIDE THE FIRST YEAR OF CONTRACTOR MAINTENANCE AFTER OPERATIONAL DEPLOYMENT FOR BOTH HARDWARE AND SOFTWARE
- PROVIDE SYSTEMS FOR ALL AREA CONTROL FACILITIES
- PROVIDE INSTALLATION, SITE ADAPTATION, AND PREPARATION FOR FULL ATC SYSTEM OPERATION AT EACH SITE PRIOR TO ACCEPTANCE

AAS ACCOMPLISHMENTS

- DESIGN COMPETITION PHASE PROPOSALS RECEIVED OCT 24, 1983
- SELECTION PROCESS UNDERWAY AND ON SCHEDULE
- CONTRACT AWARDS SCHEDULED FOR AUGUST 1984
- TRANSITION PLANNING TEAMS ESTABLISHED, DELIVERED PRELIMINARY REPORT
- JOINT AT/AAP SECTOR SUITE EVALUATION TEAM ESTABLISHED, DELIVERED 3 MAJOR REPORTS
- PRIME CONTRACTOR MONITORING TEAMS ESTABLISHED

ADVANCED AUTOMATION SYSTEM SCHEDULE



PROGRAM MANAGEMENT APPROACH IMPLEMENTED

- AAP DESIGNATED A MAJOR SYSTEM ACQUISITION (A-109 GUIDELINES)
- DOD/NASA MANAGEMENT DISCIPLINES APPLIED
- EMPHASIS ON TOTAL SYSTEM/LIFE CYCLE MANAGEMENT

SEI CONTRACTOR RELATIONSHIP

- CONTRACTOR HAS ESTABLISHED A PROJECT SEGMENT DEDICATED TO THE AAP

- WILL PHASE INTO THE FOLLOWING AREAS:
  - ENGINEERING SUPPORT
  - INDEPENDENT VERIFICATION & VALIDATION (IV&V)
  - PROJECT MANAGEMENT SUPPORT
  - TECHNICAL DIRECTION OF AAS PRIME CONTRACTORS

- DIFFERENT PHASE-IN SCHEDULE FOR EACH AREA

SEI PHASE-IN

- IV&V SUPPORT
  - BEGIN AT ONCE
  - REQUIRE RAPID BUILD-UP FOR AAS DESIGN COMPETITION AWARDS IN AUGUST 1984
  - DETAILED WORK PLANS PRESENTLY BEING PREPARED

Mr. GLICKMAN. Al, I am going to direct the questions to you and then you can farm them out as you deem appropriate.

What is the general explanation of the 6 months to a year slippage of critical milestones in the Host and the AAS programs? At least that is what appears to be on the charts that you provided.

Mr. ALBRECHT. Addressing the AAS program first, Mr. Chairman, there is a 6-month change in the contract award date, not in the implementation schedules. The reason for the slippage in the award date was to provide for a fourth competitor, Gould, which was considered in the best interest of the Government. Part of this time was time requested and needed by the fourth competitor. Part of that time was to recognize the added evaluation load that the FAA would have to perform, and we call for a great deal of detailed documentation. So that move was not taken lightly. So basically that is the reason for the AAS change.

In the Host, that program schedule has not changed since a year ago, so it must have been from a report we submitted somewhat earlier than that, and there was a change. Initially, the specifications for the Host procurement were written around a GSA format that basically called for off-the-shelf procurement, and that format was not suitable for this kind of procurement. We had to rewrite the entire procurement document structure. In addition, we also needed a delegation of procurement authority from GSA which took some time.

So I believe those two factors accounted for that initial change in Host schedule, but that schedule has remained stable now for the last year.

Mr. GLICKMAN. What do you see in terms of any further slippage on the two programs?

Mr. ALBRECHT. I see no change in further slippage, assuming, of course, that the funding required to support those programs is available.

Mr. GLICKMAN. Do you still need all of the F&E money that you are projecting there?

Mr. ALBRECHT. We certainly do, Mr. Chairman, and, you know, I left out a few things in your earlier comments on what impact a reduction in F&E funding would have, aside from what we would do. I hope you understand I was not making recommendations; I was trying to identify a few options we both might have to consider.

There are perhaps some 12 major projects that we would have difficulty starting in 1985 with a substantial reduction in funds. But I think perhaps more serious would be a loss of confidence by the users, certainly a substantial reduction in interest by the industry that now is providing outstanding competition on these programs to the best interest of the Government; and there would be some risk in how we later interconnect to the programs that are currently underway. It could be a very serious problem.

Mr. GLICKMAN. Will the 1985 and 1986 budget requests adequately support the current schedule?

Mr. ALBRECHT. Yes, sir.

Mr. GLICKMAN. You mentioned lower activity forecasts as a reason for lower benefits. Is there kind of an implication there that the dollars fall at the end of the F&E.

Mr. ALBRECHT. Yes, sir.

Mr. GLICKMAN. As a result of lower activity?

I wonder if you could be more specific as to the changes in forecast activity.

Mr. ALBRECHT. Well, the changes of forecasted activity came in two colors. Most of it was in the outyears, and most of it was attributable to general aviation. As Mr. Frisbie said, the impact on cost avoidance was about $1.6 billion out of a $21.5 billion number. That is not a major item.

On the other hand, the need to replace the equipment has not changed, and the need to gain the productivity that provides many of these benefits also had not changed. We don't see that change of forecast being very significant.

Mr. GLICKMAN. I am trying to figure out what kind of costs would be obviated by this lower activity forecast; what kinds of things would not be required to have money spent on.

Mr. ALBRECHT. I don't have details on that, Mr. Chairman. Perhaps Frank or someone else might.

Mr. FRISBIE. Thank you, Mr. Chairman.

I believe that we are talking about a cost avoidance scenario, and in the option without the NAS plan there are a number of activities that were activity-dependent. And so to the extent that facilities were activity-dependent, they would have to be added, if activity went up. Without that activity, personnel and equipment to support that activity would not be needed. But this is in the base line without the NAS plan option.

So we are talking about a loss in cost avoidance as a result——

Mr. GLICKMAN. Let me ask you something, then: Have you changed your traffic projections from the last time that you testified; and what are they? What I am trying to figure—have we lessened the urgency for modernizing the ATC plan at all?

Mr. ALBRECHT. I don't think the urgency has been lessened in any way, Mr. Chairman. I guess one way of looking at it, if there are somewhat fewer people using the system then the benefits accrue across a smaller base of users, if you will. So that the total benefit package becomes somewhat less. But, as I think the numbers indicate, that reduction, we believe, is fairly small. Forecast change is fairly negligible compared to the total activity pattern.

Mr. GLICKMAN. What changes have you made in traffic forecasts, I wonder, in the last year?

Mr. ALBRECHT. I can't give you numbers, Mr. Chairman. I can for the record.

The record shows a reference to publication FAA-APO-84-1 entitled "FAA Aviation Forecasts" dated February 1984 of the U.S. Department of Transportation, Federal Aviation Administration.

Mr. GLICKMAN. I think that is important to have for the record.

Mr. ALBRECHT. Thank you.

Mr. GLICKMAN. And I realize those numbers periodically change.

Mr. ALBRECHT. They are reviewed every year.

Mr. GLICKMAN. You are not showing any substantial reduction in traffic, are you, over the next 20 years?

Mr. ALBRECHT. No.

Mr. GLICKMAN. Are you showing less traffic 20 years from now than you would have today?

Mr. FRISBIE. I think there is a decrease in the rate of increase, is the proper way to put it.

Mr. GLICKMAN. A reduction in the rate of growth?

Mr. FRISBIE. Yes, sir.

Mr. ALBRECHT. I like those words.

Mr. GLICKMAN. Al, there has been a bill introduced to create an Associate Administrator of the FAA for the NAS plan. I think Mr. Levitas of Georgia has introduced this bill.

I wonder—I don't know whether you want to comment specifically on this bill or not—has the FAA made any formal notification to the committee on how it feels about this bill?

Mr. ALBRECHT. As far as I know, Mr. Chairman, there is no official statement of policy on this bill. I suspect when the new Administrator comes onboard, he will want to take a look at this.

I have a personal comment that is certainly nothing else than that. One of the many things that Mr. Helms managed to do over the past few years is to eliminate a longstanding problem within FAA of having a number of engineering departments, and this really cost us in terms of time and money. We would develop and hand over a product, and it would be totally worked over. It was a longstanding problem. So 2 years ago, he combined the airways facilities organization and engineering and development organization, and later Val Hunt's automated program office into one entity with a cradle to grave responsibility and accountability for all those programs. We have had 2 years under Mr. Helms' guidance to get people in place, and that organization is functioning very well.

In addition, there are a number of responsibilities that are not just NAS plan. I think Frank alluded to some of them in the chart he had. One of them is the simple problem of maintaining the current air traffic control system. There are about 10,000 airways facilities maintenance people out there that we are basically responsible for in terms of how they do their job today and in the future; and, of course, the F&E people whose job is to install and do facility engineering.

The R&D for regulatory functions, cabin fire safety work, the runway icing work, the crashworthiness work, is part of this organization's job. We do airport R&D, lighting and marking, try to minimize delay, concrete R&D, and so forth, finally advanced development work, looking at satellite applications looking into the future. There are major interfaces with airway traffic service, and a big problem is transitioning from where we are now to where we are going. So it is possible that a new Associate could cut that baby in two, could separate those responsibilities and perhaps could then further spread some critical management resources that are now devoted to those programs. It would probably call for split responsibilities between the F&E and certainly complicate our interfaces with NASA and DOD.

An item, for example, is hardware and software configuration management. We need to transition from the current 90–20 system to the new system smoothly, and perhaps it would be more difficult if two organizations were responsible for that work.

So basically, I guess I have to say as a personal comment that we have 2 years behind us; it is working well. If those functions were

really assigned to a new Associate, then you would not have the organization you now have.

Mr. GLICKMAN. Well, I appreciate your comments.

My own reaction of this is that I think that it is nothing that Congress should mandate on the FAA; and nothing, certainly, that it should interfere with the new Administrator's review of the entire operation. But I think your comments are useful.

Mr. Frisbie, let me ask—or Al—and maybe Mr. Frisbie would ask—I think it relates to some of the things in his—I am concerned about the SEI contractor's authority to give technical direction to your individual project contractors. Can you explain how this will work?

Mr. FRISBIE. Thank you, Mr. Chairman.

It turns out that technical direction is something which the major contractors in this country are very comfortable with. Most of them have worked in the role of systems engineering and integration contractor and subcontractor, interchangeably, so this is not something new to them, although it is new to the FAA.

Technical direction is the authority to interpret the language of specifications. In that interpretation they are not allowed to change costs, schedule, scope, or contract terms. It is a bilateral determination between the SEI contractor and the contractor who is receiving the technical direction that that situation is the accurate situation.

In the event that there is any conflict in that dialog between those two parties, FAA system integration contractor has to come to the FAA and the FAA has to resolve any difficulty arising there. But, again, Mr. Chairman, this is something which is routinely employed by large industrial firms, and I don't anticipate there will be any difficulty.

Mr. GLICKMAN. Will there be limits on this authority, and how will you maintain control over the use of this authority?

Mr. FRISBIE. There are limits, as I said. The Martin-Marietta contract is very specific on what it is that Martin is allowed to do. There will be liaison arrangements that will be introduced in our existing equipment contracts that make it very clear just how this interface will take place between Martin and the original equipment manufacturers. There is a structure, a document that will be used to document these changes. There will be no changes that don't come under the purview of the program manager who is responsible for that program. So I think there are adequate safeguards, there will be very precise documentation, and there are contract provisions which safeguard any abuse.

Mr. GLICKMAN. Explain to me how the contractor, SEI contractor, will share in the risk of successful implementation of the NAS plan. I mean, as I understand it, we are going to be paying over a period of years several hundred million dollars to this contractor, and I want to know that the monkey is on that contractor's back to as large extent as possible to make sure this plan does work.

Mr. FRISBIE. Mr. Chairman, the contract with Martin is a cost-plus award fee contract. Martin's profit in this undertaking is tied to our success in achieving the NAS plan milestones. We have a number of evaluators within FAA who will evaluate the Martin

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performance, technical performance as well as their performance and our performance in achieving the NAS plan milestones.

The profit that they get in each award fee period, each 6-month period, will depend upon their success in helping us to achieve the goals that we have set for ourselves. So their profits depend upon our combined success.

Mr. GLICKMAN. And who are the evaluators again?

Mr. FRISBIE. There are literally perhaps 100 evaluators that are spread across the FAA, those people who are directly involved with the particular activity that Martin is engaged in. It culminates in coming up with a fee to me, and I'm the fee determining official. It's my determination in the end that determines whether or not Martin gets a profit and what the extent of that profit is within the limits that we have specified.

Mr. GLICKMAN. What would Martin's costs be composed of in all of this work?

Mr. FRISBIE. The salaries that they pay to their people; any facilities which they have had to provide exclusively for this contract; things of that nature.

Mr. GLICKMAN. And do you have to approve those costs as well as their profit?

Mr. FRISBIE. I think approve is not the proper word, Mr. Chairman. But we do audit all those costs to make sure those costs are in accordance with the contractual requirements imposed across the board.

Mr. GLICKMAN. What is the size of the contract?

Mr. FRISBIE. $684 million across 10 years.

Mr. GLICKMAN. Does that number include both profit and——

Mr. FRISBIE. Yes, sir.

Mr. GLICKMAN. Let me switch gears for a moment. I wonder if you, or perhaps Mr. Frisbie, could comment on the problems—technical, operational, or political—on the consolidation of the flight service stations, and also the enroute and terminal control centers, as well?

Mr. FRISBIE. That is a good question.

First of all, we have many consolidations that are part of the NAS plan that don't involve manned facilities, so those don't seem to create very much attention. Those, like the flight service station and the consolidation of en route and terminal facilities, because they do involve people, have drawn some considerable attention. We are proceeding with our plan based on our expectation that we will get the authority to consolidate those facilities, so we are buying the equipment to support the plan. So we are planning, for example, on 23 air route traffic control centers and 61 automated flight service stations.

We have a number of buildings, flight plan areas, that have selected the automated flight service station building. Those buildings are going up. So if there was some restriction on our ability to consolidate, it would severely impact the present engineering plans that we have underway.

Mr. GLICKMAN. In terms of technical and operational problems, consolidation both of the flight service station and en route and terminal control centers pose what problems?

Mr. FRISBIE. I think the operational problem, Mr. Chairman, would be in order to operate in the nonconsolidated mode, FAA would need more people than we are presently planning on having. We expect to get economies from consolidating these facilities. If we are not to get those economies, then our staffing would have to be higher.

We would also have the same problem with respect to maintenance. We are expecting to get economies with respect to our maintenance people. We would not have those.

We have some very old equipment in many of those facilities. That equipment is not presently scheduled to be replaced. So we would have a lot of adjustments to make if we were not to go forward.

Mr. GLICKMAN. Well, I think you need to be aware of, obviously—I have mentioned three problems: technical, operational, and political. The last may be the most severe problem, which is something you just have to always keep in mind when you operate a system. And there is not much we can say about it right now except that is something the new Administrator will have as probably a very significant priority as he comes up here on Capitol Hill.

Mr. ALBRECHT. We are aware of that problem.

Mr. GLICKMAN. I would like to ask Mr. Hunt this question: How expensive are the software changes needed to rehost the old en route software on the new computers? What is your assessment of the risk involved there?

Mr. HUNT. The number of lines of code that need to be modified is a good measure of the extent of changes, and we see something like 25,000 lines of code to be modified out of something like 1 million. So that is between 2 and 3 percent. We consider that to be a low-risk operation. The principal problem, I think, as far as risk is concerned, is the schedule.

Mr. GLICKMAN. The schedule?

Mr. HUNT. The schedule.

The FAA established a very ambitious schedule for this project, and I am sure the contractors are going to have to work very hard to maintain that schedule.

Mr. GLICKMAN. Would the changing in the numbers affect that schedule at all?

Mr. HUNT. Changing?

Mr. GLICKMAN. The budget numbers?

Mr. HUNT. No, not unless there were future changes.

Mr. ALBRECHT. Automation program is. We don't really have priorities in the sense, Mr. Chairman, but we would expect that we would try to protect that funding to the best extent we could.

Mr. GLICKMAN. Even if the House Budget Committee prevailed on a program freeze?

Mr. ALBRECHT. We have a different set of rules under that condition.

Mr. GLICKMAN. OK.

Mr. Hunt, last March there were questions of manning to meet the contracting and technical workload. Has that problem been resolved and is the current personnel adequate?

Mr. HUNT. The current staff is up to full capacity, and the SEI contractor is onboard. As I have reported, he is making excellent

progress in supporting the program office so we feel that the staff is adequate between the two.

Mr. GLICKMAN. And last March there were questions with regard to the delays in bringing in certain support contractors—for example, independent software, verification and validation support.

What is the status of this particular problem?

Mr. HUNT. At that time—at this time, that problem has gone away. We do have the staff onboard as a part of the SEI contractor's staff. We would like to have had it sooner, but that wasn't to be.

Mr. GLICKMAN. Mr. Albrecht touched on this. We touched about the delays on the Host and AAS. I think that you said on the AAS the delay was caused by bringing in a fourth.

Mr. ALBRECHT. A fourth competitor.

Mr. GLICKMAN. Why was that done, can I ask?

Mr. ALBRECHT. It appeared to be in the best interest of the Government to add the extra competition, Mr. Chairman.

Mr. GLICKMAN. OK.

How many SEI personnel are there now, and how many will be assigned to the advanced automation program?

Mr. HUNT. Currently, the staff consists of 28 people, and at the peak of the activity, which I believe—well, let me say that the currently planned peak is something like just under 102 or some such number. That peak is expected to occur in late 1986.

Mr. GLICKMAN. I wonder if you might respond, what are the key technical concerns in the advanced automation program?

Mr. HUNT. Well, the advanced automation system is a state of the art system, and it is a large software development undertaking. And, as always, I think the high risk is that the software development will be performed on schedule. We think there is something like 2 million lines of code to be developed, and that is a very ambitious undertaking. We think that is the principal risk.

Mr. GLICKMAN. I am going to ask you some questions on other subjects in the R&D budget, but I would just make a couple of suggestions. One, of course, is that you had some charts which show that you're going to be testing.

What are you going to be testing out at the tech center in Atlantic City?

Mr. HUNT. On the Host program?

Mr. GLICKMAN. Yes.

Mr. HUNT. We plan to have each contractor bring his set of equipment that he proposes for the Host computer program, bring a complete set of that to the technical center, and to test the rehosted software on that to demonstrate that it meets the full requirements of our specifications.

Mr. GLICKMAN. I would encourage you to not be shy; if you face any technical problems that you did not anticipate, that I don't think you're going to find us jumping on you. We want to know about them early on so we can help you resolve them. If we hear about them later on without knowing about them in advance, that is where you get in trouble.

Mr. ALBRECHT. We fully intend to keep the committee informed.

Mr. GLICKMAN. If there are any glitches in this thing, please let us know.

Mr. ALBRECHT. We certainly will.

Mr. GLICKMAN. Let me move on to some of your other programs. You are going to be back on Wednesday talking——

Mr. ALBRECHT. We are going to brief you on the entire program Wednesday.

Mr. GLICKMAN. Then I'm not going to ask you questions about air safety.

Mr. ALBRECHT. We'll cover those on Wednesday.

Mr. GLICKMAN. OK. I think that takes care of it, and I appreciate the clarity of your testimony.

Mr. ALBRECHT. Thank you, and we look forward to seeing you on Wednesday.

Mr. GLICKMAN. The hearing is adjourned until Wednesday.

[Whereupon, at 3:05 p.m., the subcommittee recessed, to reconvene on Wednesday, March 28, 1984.]

SEI PHASE-IN (CONT.)

- ENGINEERING SUPPORT
  - LOW LEVEL STAFFING NOW, GRADUAL BUILD-UP
  - CURRENT ENGINEERING SUPPORT BY RCA
- PROJECT MANAGEMENT SUPPORT
  - CURRENT SEI CONTRACT PROVIDES AUTOMATED PROJECT MANAGEMENT SUPPORT TOOLS FOR THE ENTIRE NAS PLAN
- TECHNICAL DIRECTION
  - WILL BE PROVIDED FOR ADVANCED AUTOMATION SYSTEM ONLY, AND BEGIN AFTER CRITICAL DESIGN REVIEW

PLAN FOR FY 1985

- COMPLETE HOST SYSTEM COMPETITIVE TESTING AT FAA TECHNICAL CENTER
- AWARD HOST ACQUISITION PHASE CONTRACT
- COMPLETE SEI CONTRACTOR PHASE-IN
- COMPLETE CONSTRUCTION AT FIRST HOST SITE
- COMPLETE AAS SYSTEM DEFINITION PHASE BY CONTRACTORS
- COMPLETE AAS SYSTEM REQUIREMENTS REVIEW
- BEGIN AAS SYSTEM DESIGN
- COMPLETE SECTOR SUITE MOCK-UP EVALUATION

OVERSIGHT ON THE FEDERAL AVIATION ADMINISTRATION FISCAL YEAR 1985 RESEARCH, ENGINEERING, AND DEVELOPMENT BUDGET REQUEST

WEDNESDAY, MARCH 28, 1984

HOUSE OF REPRESENTATIVES,
COMMITTEE ON SCIENCE AND TECHNOLOGY,
SUBCOMMITTEE ON TRANSPORTATION,
AVIATION AND MATERIALS,
Washington, D.C.

The subcommittee met, pursuant to recess, at 9:40 a.m., in room 2318, Rayburn House Office Building, Hon. Dan Glickman (chairman of the subcommittee) presiding.

Present: Representatives Glickman, Boehlert, and McCandless.

Mr. GLICKMAN. The subcommittee will be in order.

Why don't we begin this morning? Today the subcommittee begins our second day of oversight hearings on the FAA's research, engineering and development programs. Last Monday, we heard an overview of the status of the national airspace system plan, with specific emphasis on the host computer program, the advanced automation program, and the Systems Engineering and Integration contract.

Today we plan to review a number of the FAA's ongoing research programs on aviation safety, aviation weather, navigation, and others. We are particularly interested in the status of specific projects such as cabin fire safety, windshear, aircraft icing and deicing, crashworthiness, collision avoidance, and satellite-directed navigation.

I look forward to another productive hearing and welcome the expert witnesses from the FAA who have agreed to testify today. It is a pleasure to see you all back again today.

Al, why don't you begin as you see fit?

STATEMENT OF ALBERT P. ALBRECHT, ASSOCIATE ADMINISTRATOR FOR DEVELOPMENT AND LOGISTICS, FEDERAL AVIATION ADMINISTRATION, ACCOMPANIED BY VALERIO HUNT, DIRECTOR, ADVANCED AUTOMATION PROGRAM OFFICE, AND MARTIN POZESKY, DIRECTOR, PROGRAM ENGINEERING AND MAINTENANCE SERVICE

Mr. ALBRECHT. Thank you, Mr. Chairman.

We are back in force this morning, and we are ready to complete our report on the status of the NAS plan and, in particular, the RE&D program.

Before starting the review, I understand we have a problem that needs fixing. Apparently, we have not established with the committee a fixed set of milestones for each of our efforts that we can use together to track progress from year to year.

I have instructed Bill Allen of my staff to work with your staff in developing such milestones and to see that they are used in all future reports and discussions with the committee. I appreciate that this must have been an inconvenience, and we will fix it.

Now for this morning, we want to finish the review of the R&D program. We all covered the advanced automation portion of the program Monday afternoon.

This morning, Frank will open with a brief relook at the RE&D 5-year plan. Then Neal will cover two major elements of the program, aviation weather and aircraft safety. Then Frank will return with some of the other major RE&D efforts.

So, with your permission, I will turn the meeting over to Frank.

STATEMENT OF FRANK L. FRISBIE, DEPUTY ASSOCIATE ADMINISTRATOR FOR DEVELOPMENT AND LOGISTICS, FEDERAL AVIATION ADMINISTRATION

Mr. FRISBIE. Thank you, Mr. Chairman.

Before Neal Blake and I present the current status of our major R&D efforts, I would just like to return to the 5-year plan Vugraph we looked at on Monday.

[Slide shown.]

I would like to reinforce the comments that I made on a need to maintain the authorized level in the R&D account. We are all very concerned about the possibility of limiting the fiscal year 1985 F&E to the fiscal year 1984 appropriation level.

At the same time, we cannot lose sight of the fact that our R&D request is devoted primarily to producing products that are crucial to the accomplishment of the plan. Host computer, advanced automation system, AERA, Data-Link, BSCS, automation upgrades, flight service station enhancements, weather items—all critical to the timely implementation of the plan.

There are other items in the program that are essentially safety related: Aircraft safety and TCAS.

My only point is to again reinforce that the fiscal year 1985 R&D appropriation could very well tell the tale of our ability to bring the NAS plan to fruition.

So, with that brief introduction, I would like to introduce Neal Blake, who is going to talk about the weather programs and the aircraft safety programs.

Neal?

STATEMENT OF NEAL BLAKE, DEPUTY ASSOCIATE ADMINISTRATOR FOR ENGINEERING, FEDERAL AVIATION ADMINISTRATION

Mr. BLAKE. Thank you, Frank, and good morning, Mr. Chairman.

I appreciate this opportunity to discuss the FAA's aviation weather plans and programs with you.

[Slide shown.]

May I have the next Vu-graph, please?

[Slide shown.]

In 1982, Congress urged the FAA to designate a single focal point for all FAA aviation weather activities.

In January 1983, former Administrator Helms named a deputy associate administrator for engineering as the FAA weather program coordinator, reporting to the associate administrator for development and logistics.

The program office, along with the operating services, serves as the interface with the National Weather Service, Department of Defense, Federal coordinator for meteorological services in supporting research, the user community, and international bodies as appropriate.

The program office provides oversight, coordination, and monitoring of all of our aviation weather activities from the planning phase through research, development and implementation.

The office consists of several full-time people and a National Weather Service representative.

In addition to the primary responsibilities, the weather coordinator serves as the FAA representative to three interagency councils: The Next Generation Weather Radar, the Joint Automated Weather Observing, and the National Aircraft Icing program.

To insure that the aviation weather program was responsive to FAA needs, the weather program steering committee was established to provide policy guidance and oversight. This committee is comprised of the associate administrators for development and logistics, aviation standards, and air traffic.

[Slide shown.]

FAA's aviation weather system plan was published and released to industry in February of this year. This plan was developed based on a summary of aviation weather system requirements proposed by the aviation community and our own assessment of what was needed to carry out our aviation weather mission.

The part of the requirements development process included a review of aviation requirements and existing Federal programs which address these requirements. This review was led by the office of the Federal coordinator for meteorology.

FAA published a draft plan in August and briefed industry on the contents of the plan at that time. FAA solicited industry comments and incorporated these in the final plan. Copies of the plan were forwarded to Congress the last week of February by our congressional liaison staff.

It is our intent that the aviation weather system plan be reviewed and updated annually as a supplemental plan to the national airspace system plan.

Next Vu-graph, please.

[Slide shown.]

Additionally, in response to congressional direction in 1982, FAA contracted with the National Academy of Sciences in March of 1983 for a comprehensive study of wind shear, and the study was completed last fall. The final report was released in November and transmitted to Congress in December.

The study group made 19 major recommendations covering pilot education, training, regulatory action, development of systems for detection and prediction of wind shears, studies of wind shear effects on aircraft performance, and advanced research programs.

The FAA already has ongoing programs which are responsive to the majority of the recommendations and is planning to address all the wind shear issues through an integrated wind shear program spanning the next 2 to 4 years.

[Slide shown.]

This Vu-graph identifies seven of the key recommendations from the national academy study. To insure that a fully integrated wind shear program is conducted, we are considering the appointment of a wind shear program coordinator to specifically look after this program.

We are currently proceeding with programs to enhance the low-level wind shear alert system performance and to develop the next generation doppler weather radar. I will be reporting on these activities in a moment.

Research in the development of improved airborne sensors is continuing, and the focus for this activity is primarily in NASA. However, we are following some programs and will be testing some equipment developed for the Department of Defense.

A great deal of research has been done in the area of aircraft flight characteristics and the performance of various guidance and flight control systems. This activity has resulted in the publication of advisory circulars and also research and development reports covering the operation of aircraft in wind shear conditions. We are continuing to examine this area in conjunction with NASA to see if additional activities could provide improved performance, particularly of the flight guidance systems.

We have recently published an advisory circular summarizing certification requirements for airborne wind shear equipment. We have also published advisory circulars relating to pilot procedures when operating in wind shear conditions. We are continuing our research on the nature of low-altitude wind shear. We will be recording data at our low-level wind shear alert system facilities and analyzing this data to determine the incidence of wind shear phenomena in the various geographical areas of the country.

In addition, we are establishing a test bed at Memphis to determine the performance of doppler weather radars in wind shear detection. This program will also provide further information on the characteristics of wind shear as they occur in the Memphis area, which is representative of the climatology in the Southeast part of the United States.

I would like to now report briefly on the status of some of our near-term improvement programs.

[Slide shown.]

Implementation of leased service A equipment, which includes both terminals and communication links, will be completed this year and will provide improved communications at our center weather service units and our flight service stations.

An interim voice response system is being procured to permit pilots in the continental United States to retrieve weather information by telephone directly from our automated weather data base.

Sixteen systems located throughout the country and using a combination of local and foreign exchange telephone circuits will provide service to 25 major population centers. Pilots will receive surface observations, terminal forecasts, grid winds, transcribed weather broadcasts, convective SIGMETS, and severe weather forecast alerts.

Implementation will begin this year and should be completed in 1985. This interim system will help meet the demand for service until the flight service automation program is fully implemented.

[Slide shown.]

The radar remote weather display system program will equip 134 radars, 77 National Weather Service radars and 57 FAA long-range radars, with digitizing and remoting equipment.

Displays at the center weather service unit and the en route flight advisory service positions will identify six intensity levels through the use of color, enabling the meteorologists and the specialists to provide more accurate real-time severe weather information to both pilots and controllers.

Implementation is scheduled for completion at all center weather service units and en route flight advisory service positions by June of 1984.

Data from the geostationary operational environmental satellites is now being received at 20 center weather service units, 20 flight service stations, and the central flow control facility. It will also be available to all en route flight advisory service positions and selected high-density flight service stations by 1985. In all, we plan to equip 64 locations.

[Slide shown.]

The low-level wind shear alert system is a real-time surface wind sensor system which uses minicomputer processing to evaluate wind speed and direction from sensors on the airport periphery and compare that data with center field wind data.

A 15-knot vector difference triggers an aural and visual alarm in the airport control tower. The system was originally developed for gust-front detection at the airport and has successfully detected wind shear phenomena.

During the time that the alert is posted, the air traffic controllers must provide wind shear advisories to all arriving and departing aircraft. The status of this program is that 110 systems have been funded, 59 systems installed and operating, and 51 systems are scheduled for installation in 1984 and 1985. The contract for these later systems has just been awarded.

The low-level wind shear alert system at the New Orleans International Airport is being expanded to test the capability of the system to detect microburst wind shear phenomena.

Five additional sensors are being added to the current system to provide improved coverage along the runway. We have been assisted in siting these sensors by Dr. John McCarthy of the National Center for Atmospheric Research. Dr. McCarthy has been a key researcher in analyzing the data from the joint airport weather study, a program which has provided us with a great deal of knowledge about the wind shear phenomena.

Processor and software modifications are being made that will alter the technique for comparison of wind vectors between sensors

and the generation of wind shear warnings based on these comparisons.

A 1-year test period will start in late May or early June, and the results of this testing will determine ultimate decisions on whether to make modifications to the low-level wind shear alert systems at our other locations.

In parallel with this field test, the National Center for Atmospheric Research, under contract to FAA, is conducting studies in computer simulations to develop alternative algorithms and data processing strategies to further improve system performance.

[Slide shown.]

The automated weather observing system is being implemented to provide efficient, reliable, and cost effective automated weather observations at a significantly greater number of airports than today. The system will provide automatic sensing of wind direction and velocity, altimeter setting, temperature, precipitation, dew point, and visibility. At some manned sites, supplementary data may be added through a keyboard.

The primary output is a synthesized voice broadcast. The data, however, will also be output to the National Weather System data base.

The demonstration program is presently in progress at 14 airports. These demonstrations will obtain equipment reliability data, correlation data between manual and automatic observations and pilot evaluations.

Implementation of the automated weather observing system is planned to begin in fiscal year 1986—that is, December 1985—with contract award planned for January 1985. An initial procurement of 745 systems is planned.

[Slide shown.]

I would now like to move on to some longer term development programs directly supporting the national airspace system plan. First is the next generation weather radar program. The goal of this program, which, as you know, is a joint program with the Departments of Commerce, Defense, and Transportation, is to develop and field a doppler weather radar which will meet the joint weather detection needs of FAA, National Weather Service, Air Force, and other Government and private organizations.

The aviation weather products which the next generation weather radar will provide include winds, turbulence, hail, frontal activity, freezing levels, mesocyclones, tornadoes, and hurricanes.

The program is now well into the system validation phase with two contractors scheduled to begin prototype development in September. Production units are scheduled for installation from 1988 through 1992, with 110 radars required to provide full coverage for the domestic 48 States.

[Slide shown.]

The Terminal Weather Radar Test Site at Memphis will provide valuable preliminary assessment of the problems associated with the operational use of doppler weather radar in an airport environment.

Lincoln Laboratories has assembled an operating terminal doppler radar and developed processor algorithms which are tailored to the terminal environment. This system will be used in conjunction

with a second doppler radar to assess system performance for both on and off airport locations and to evaluate scanning strategies, data processing, and data display techniques.

Testing at Memphis is scheduled to start in June 1984 and be completed in December 1984. This will be followed by similar tests at two other airports representing different wind shear environments.

[Slide shown.]

Another very major weather program is the central weather processor program. The purpose of the central weather processor, which will be located in each area control facility, is to improve the management, processing, and dissemination of weather information throughout the national airspace system.

The central weather processor will be the focal point for the aviation weather system processing, for the center weather service unit meteorologists, for the air traffic controllers, the flight service station specialists, and the pilots.

System capabilities will include weather radar mosaicking, the overlay of satellite visual and infrared images with radar data, the looping and full manipulation of the weather data in color graphic presentations, and the distribution of weather information throughout the air traffic control facilities.

This processor will also contour and tag areas of hazardous weather, and these hazardous areas will be displayed on controller and flight service station specialist displays and will be available for cockpit display through remoting over the mode S data link.

The FAA is currently developing system specifications and functional requirements for the central weather processor. The first prototype is scheduled for delivery to the FAA Technical Center in mid-1987. Present planning calls for a total of 26 systems with field implementation planned for fiscal year 1990 through 1992.

[Slide shown.]

The mode S system provides both improved surveillance and data link services. On initial implementation, mode S will send terminal winds aloft forecasts, surface observations, hazardous weather alerts, pilot reports, and radar summaries to the cockpit.

The flight service automation system program was started to promote flight safety through more accurate and timely pilot briefings, to meet the increased demand for services, and to reduce the cost of providing those services.

This program provides for several stages of automation. The first provides automation of alphanumeric products to flight service station specialists via modern computer terminals and includes flight plan filing capability. Closed-circuit television and high-resolution facsimile will supply the graphic products.

The next automation level builds upon this capability by adding graphic displays for weather radars and other weather information and limited direct pilot access services. Subsequent enhancements will add telephone voice response units, direct user access terminal systems, and airborne mode S services.

Implementation is planned to start in fiscal year 1984, with full system being operational by 1989. Along with this program, we will begin to transition from our present 300-plus flight service stations to a final total of 61 automated stations.

One of the programs that supports the flight service station automation is the automated route forecast program. This program is designed to replace the current broad area forecasts with more specific route-oriented forecast information. The objective is to generate automatically route-oriented aviation weather forecasts for pilot self-briefing and for flight service station specialist briefings. Demonstration of the concept was completed in the fall of 1982.

Improved accuracy and frequency of winds aloft observations and forecasts are required to improve fuel efficiency of flight operations and are also needed to achieve the full benefits from our advanced automation program. These include more accurate, conflict-free flight path planning and less maneuvering for separation assurance. The better we know the wind, the better the flow planning of a traffic management system will work.

Improved sensors for surface observations are also needed. Laser solometers undergoing testing by the National Weather Service give promise of measuring cloud heights up to 10,000 feet in an ice-safe manner.

Implementable sensors which can identify cloud types, however, are yet to be developed. Present weather sensors which can give some limited information on present weather conditions have already been developed, but further development is clearly needed in this area.

There are also some areas where improved technology is needed, and these areas of unmet needs include: improved accuracy in measurement and forecasting of winds aloft information for both domestic and oceanic areas; improvement in sensors for present weather, cloud height, cloud type, vertical wind shear detection, and weight vortex detection; improvement in short-term forecasts; improved icing and turbulence forecasts; and development of airborne turbulence and wind shear systems.

There are several activities already underway in this area. One is led by the office of the Federal Coordinator for Meteorology and is developing a plan for improved icing forecasts.

NASA is working on a merit program and is examining and testing techniques for improving winds aloft forecasts.

The FAA, working in conjunction with the other agencies, will be developing a plan for improvements in all of the aviation forecast areas.

In summary, we believe that the programs we have undertaken or are planning will provide for substantial improvement in the observation, processing, and dissemination of weather information.

[Material follows:]

Aviation Weather Overview

Aviation Weather

Background

- FAA Weather Programs Coordinator Named: January 1983
  - — Deputy Associate Administrator for Engineering
  - — Serves as FAA Focal Point for All Aviation Weather Programs
  - — Serves as FAA Interface With NWS, DOD, NASA, OFCM, Other Federal Agencies and User Groups
  - — Provides Oversight, Coordination and Monitoring of All FAA Weather Programs and Activities

- Weather Program Steering Committee
  - — Associate Administration for Development and Logistics
  - — Associate Administrator for Aviation Standards
  - — Associate Administrator for Air Traffic Services
  - — Policy Guidance and Oversight

Aviation Weather Plan

- Developed Summary of Aviation Weather System Requirements
  - Aviation Community
  - OFCM Review by Federal Agencies
  - FAA Assessment of Needs
- Drafted Proposed Plan
  - Public Meeting With Users and Other Federal Agencies
  - Review and Comment Period—90 Days
  - Internal Review and Coordination
- Comments Assimilated Into Re-Draft
- Plan Released February 1984

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Aviation Weather

National Academy of Science Wind Shear Study

- Congressional Directive: December 1982
- Contract Awarded: March 1983
- Final Report Released: November 1983

Recommendations

- Four Broad Areas
  - General
  - Detection and Prediction
  - Aircraft Performance
  - Research

Aviation Weather

Key Recommendations From National Academy

- Establish Integrated Wind Shear Program
  — Improve LLWAS Performance and Record Data
- Expedite Development of NEXRAD and Develop a Pulsed Doppler Radar for Terminal Areas
  — Continue Research on Airborne Remote Sensors
- Conduct Research on Aircraft Flight Characteristics in Wind Shear — Investigate Wide Range of Onboard Sensors and Guidance Systems
  — Update Certification Requirements for Airborne Wind Shear, Flight Guidance and Automatic Control Systems
- Conduct Additional Research on the Nature of Low-Altitude Wind Shear

Aviation Weather

Near Term Improvements

- Leased Service A (SAS) for CWSU and FSS
  - — Will Provide Medium Speed Communications and Computer Terminals at All Center Weather Service Units and Flight Service Stations
    - All Installations on Line by December 1984
- Interim Voice Response System (IVRS)
  - — Will Provide Pilot Weather Briefings Via Touchtone Telephone in 25 Major Population Centers
    - 16 Systems (25 Areas) Operational December 1984-April 1985

Aviation Weather

Near Term Improvements

- Radar Remote Weather Display System (RRWDS)
  - — Will Provide Digitized Radar Data Displays for CWSU's and EFAS Positions From 134 Weather Radars (77 NWS Weather Radars and 57 FAA Long-Range Radars)
    - Color Display of Six Levels of Weather Returns
    - 64 Locations Operational: June 1984

- Geostationary Operational Environmental Satellite (GOES)
  - — Will Provide Visual and Infrared Satellite Imagery in Near Real-Time to All CWSU's, EFAS Positions and Selected High Activity Flight Service Stations
    - Currently Operational at 20 CWSU's and 20 FSS
    - 64 Locations Operational: December 1985

Aviation Weather

Near Term Improvements

- Low Level Wind Shear Alert System (LLWAS)
  - — Provides Low-Altitude Wind Shear Advisories to the Airport Traffic Control Tower for Relay to Aircraft Arrivals and Departures
    - 110 Systems Funded
    - 59 Currently Operational Systems
    - 51 Systems Programmed for Installation in 1984/85
  - — New Orleans International Airport (MOISANT) Test Site
    - Will Provide Testing of Improved LLWAS
    - 5 Additional Remote Wind Sensors
    - Enhanced Data Processing: Comparison of Wind Vectors Between All Sensors
    - Test Period Started: June 1984
    - Testing Completed: June 1985

Aviation Weather

Near Term Improvements

- Automated Weather Observing System (AWOS)
  - — Will Provide Efficient, Reliable, Cost-Effective Automated Weather Observations for Towered and Non-Towered Airports With Approved Instrument Flight Operations and for Selected Flight Service Stations
    - Initial Capability Provides: Wind Speed and Direction, Temperature, Dew Point, Altimeter Setting, Visibility, Cloud Height and Precipitation
    - Information Available Through Control Towers, VOR Voice Broadcast and Telephone Dial-Up
    - Will Become Integral Part of National Surface Observation Network
  - — 14 Systems Currently Being Demonstrated
  - — Production Contract(s) Awarded: January 1985
  - — Initial Production System Installed: December 1985
  - — Final FAA Site Commissioned: July 1987

Aviation Weather

Long Term Improvements

- Next Generation Weather Radar (NEXRAD)
  - Will Provide Nationwide Doppler Weather Radar Data to Central Weather Service Unit Meteorologists, Air Route Traffic Control Center Controllers, Flight Service Station Specialists, and Pilots
    - Joint Development Effort With National Weather Service and USAF Air Weather Service
    - NEXRAD Aviation Weather Products Include: Winds, Turbulence, Thunderstorm Detection and Tracking, Hail, Frontal Activity, Freezing Levels, Mesocyclone/Tornado and Hurricane Detection and Tracking
    - Currently in System Validation Phase (Two Contractors)
    - Prototype Production to Begin: September 1984
    - Implementation From 1988 to 1992

Mr. ALBRECHT. Should we continue with the aircraft safety program?

Mr. GLICKMAN. Go ahead.

Mr. BLAKE. Today I would like to provide you with a brief overview of some of the major aircraft safety activities.

[Slide shown.]

This Vu-graph, which former Administrator Helms presented to this subcommittee—and, hopefully, in somewhat larger type—originally on June 27, 1983, was subsequently shown to the press at the technical center, also in June of 1983, and to a hearing that Congressman Levitas conducted in November 1983. This continues to be our major schedule.

It summarizes the activities leading to a number of rulemaking activities in the 1984-85 time period. I will touch today briefly on some of the major activities which are shown here, in particular those that we plan to conduct in the 1984-85 time period.

[Slide shown.]

Now, scheduled regulatory actions, which are conducted by our aviation standards people, the ones that result from the program, are summarized here, and these are the major ones.

As a result of the Saudi Arabian aircraft fire, FAA did extensive research and development work on class D cargo compartment liners. This has already resulted in a change in the type of materials used in some of the wide body aircraft.

In addition, FAA has established a test facility at the technical center to conduct similar testing on class C cargo compartments. The results of this work have indicated that a change in the type of cargo liner material will be beneficial in increasing the fire protection in the class C compartments.

The results of the technical work that we completed are being used in the preparation of a Notice of Proposed Rulemaking on cargo compartment materials for both class C and D compartments, and this Notice of Proposed Rulemaking will cover testing techniques and also materials criteria.

The FAA is preparing a Notice of Proposed Rulemaking to require smoke detectors in lavatories on aircraft and also disposable fire extinguisher systems in the waste compartments of those lavatories. Further, it requires carriage of at least two hand-held halon 1211 extinguishers for crew use onboard aircraft in fighting in-flight fires.

As a result of the Alcott General Aviation Safety Committee study and also past work done on crash-resistant fire systems, a Notice of Proposed Rulemaking is being prepared for release in the summer of 1984 governing requirements for breakaway fuel fittings and the routing of fuel lines and electrical lines, primarily in general aviation aircraft.

In late 1985, an advisory circular will be prepared which presents information on human tolerance to impact forces. This advisory circular will be based on extrapolations of technical data taken from military tests on volunteers.

The basic data, which was taken on young, healthy military subjects using a 3-inch lap belt restraint system, has been extrapolated by the Simulor Co. so that the results are applicable to the general

traveling public when restrained with a conventional 2-inch lap belt.

An NPRM covering improved standards for general aviation shoulder harnesses and attachment fittings is being prepared for release in the summer of 1984. This change was strongly recommended by the Alcott committee and is supported by the General Aviation Manufacturers Association.

Considerable work has been done over the years to test both standard and energy-absorbing seats. These tests have included sled tests as well as drop tests using both general aviation aircraft and sections of transport category aircraft. Additional data will be taken on seat performance during the controlled impact demonstration tests to be conducted this summer.

A Notice of Proposed Rulemaking based on the results of all of the past testing will be available in the spring of 1985.

Crash scenarios for transport category aircraft have been developed and will be made available in the form of a revised advisory circular in the spring of 1986. These scenarios are based on analysis of approximately 20 years of accident information. These scenarios have been used extensively in conjunction with aircraft structural models to predict the crash impact forces which would be imposed on seats and occupants.

The development work on interior materials criteria and test methods will result in an upgrading of fire performance criteria and test methods for cabin interior materials, based on currently available and advanced state-of-the-art materials.

The improved criteria and test methods will provide more representative performance data on how the material will actually act in the realistic large-scale fire environment, compared with current test methods.

The program will also result in the development of improved small-scale laboratory tests. The correlation and validation of the small-scale tests with the large-scale C-133 tests also form a part of this program.

Notices of Proposed Rulemaking on interior materials and anti-misting kerosene will be published late in 1984, and I will report briefly on some of the supporting research and development activities in a moment.

Mr. GLICKMAN. Could I just ask you a question?

Mr. BLAKE. Certainly.

Mr. GLICKMAN. I would kind of like, if possible, to—I don't know how much longer your total testimony is.

Mr. BLAKE. About 10 minutes.

Mr. GLICKMAN. About 10 minutes? Because I want to get into questions. OK, go ahead.

Mr. BLAKE. Thank you.

Now, in addition to the planned regulatory actions shown here, FAA published Notices of Proposed Rulemaking on emergency lighting and seat fire blocking layers in the fall of 1983, and we received industry responses on the use of fire-blocking layer materials which generally indicate strong support for the use of such materials.

[Slide shown.]

The controlled impact demonstration program is designed to demonstrate technology that can improve transport aircraft occupant survivability through reduced postcrash fire hazards and improved crash impact protection.

The major demonstration to be conducted is the verification that antimisting fuel can preclude fuel misting and prevent postimpact fireballs.

The second objective is to obtain data on impact forces and the manner in which these forces are propagated through the fuselage and floor structure to the seats and occupants.

The third objective is to demonstrate the effectiveness of both existing and improved seat restraints and structural systems.

[Slide shown.]

NASA and FAA have jointly developed a controlled impact scenario to be used for the July test, and this scenario has been thoroughly discussed with the airspace industry and is representative of a survivable accident.

We expect the fuselage to remain essentially intact, although we do expect some deformation damage locally in the structure.

The scenario values we have selected for the tests have been arrived at through extensive study and simulation using our structural models. The major aspects of the tests are summarized here.

[Slide shown.]

This Vu-graph shows an interior view of the test aircraft, which includes 71 anthropomorphic dummies and a variety of seat types. Thirteen of these dummies and the seats that they sit in will be heavily instrumented to determine the transfer of impact forces throughout the fuselage to the occupants.

The aircraft contains a total of 23 triple passenger seats, two flight attendant seats, and a pilot seat, and we will be testing both current standard seats, modified energy-absorbing seats, and improved floor attachment fittings.

The aircraft also contains overhead luggage racks and a fully equipped galley. However, no meal service is planned. [Laughter.]

[Slide shown.]

The controlled impact demonstration is a very large and complex test, and it is being jointly conducted by FAA and NASA. The primary experiments are antimisting kerosene, seat restraint systems, transport aircraft crash behavior.

Secondary experiments include cabin fire safety and equipment tests. Although we do not expect to have any fire in the fuselage, we have nevertheless fire blocked every other row of seats and put fuel-resistant advanced windows in every other window.

In the equipment area, we will be testing some of the more advanced flight data and cockpit voice recorder systems.

[Slide shown.]

The schedule for the controlled impact demonstration is shown here. The antimisting kerosene fuel degraders were installed in February, as were the crashworthy experiments. The aircraft was "buttoned up" in March. We have had two flight tests to date. We will have the next flight test in April with degraders working on standard kerosene. We will have the first flight test using antimisting kerosene in about mid-May.

The impact demonstration is planned for late July. We will be publishing an executive summary of the results about 3 months after that demonstration, and the total data package for the antimisting kerosene and seat restraint system will be completed in December 1984.

The Notice of Proposed Rulemaking for antimisting kerosene will also be in December 1984 and closely followed by one on the transport seat strength.

[Slide shown.]

Some of the highlights of the fuel program are shown here, and I will skip the first part.

We have had a Convair 880 which has been equipped with an antimisting kerosene degrader, and we have been operating one engine on that aircraft on antimisting kerosene, and we will continue those tests to explore the full flight envelope for that aircraft, and we plan about 50 hours of flight testing from this point.

The tests that have been run to date have shown good engine performance and no problems. In July, the controlled impact demonstration will give us our final test.

[Slide shown.]

The cabin fire program has developed and evaluated laboratory test methods which show good correlation with realistic, large-scale fire tests. Of course, the small-scale laboratory methods are required to provide a practical method of rapidly screening cabin materials for compliance with the regulations.

We have already completed the testing of available and improved cabin materials, and we are now into testing of advanced panel materials, including some graphite composite panels.

The program also addresses methods for detection and suppression of fire, particularly in-flight fires, and these methods are specifically designed to combat in-flight fires. They include examination of improved methods of smoke venting and of cabin environment management.

The work has also resulted in advisory circulars on improved fire extinguisher chemicals. As reported earlier, our cabin fire safety program has produced information on both fire-blocking layers and cargo compartment liners.

[Slide shown.]

The major test vehicle that we have used for our tests, our validation tests, is the C–133 laboratory shown here, with the test on the top, the non-fire-blocked seat, and the test on the bottom of a fire-blocked seat.

The testing has shown up to this point that the cabin is generally habitable until the moment of flashover, which is the point where the unburned gases at the top of the cabin ignite, and it is from that time forward that the formation of poison gas and the exhaustion of the oxygen occurs.

Now, in order to establish an upper limit on what we could achieve in improved cabin materials, NASA developed for us a special panel made out of polyimid fiberglass and with special polyimid honeycomb core and a polyether-ether ketone film. This panel, when tested in a full-scale fire facility, exhibited extremely good results. It was tested in a cabin with fire-blocked seats, and the next two Vu-graphs show the performance of that experimental panel.

[Slide shown.]

This Vu-graph shows a typical scenario where the fuselage rupture occurred adjacent to some aircraft seats in the cabin and exposed the seats and the overhead panels to the flame and radiant heat from an external pool of fire.

As you can see, the advanced panels increased the available evacuation time by somewhat over 2 minutes.

[Slide shown.]

This Vu-graph shows a slightly different scenario where the fire occurred outside of an open galley door. You will note that there was no flashover in this case, and after 6 minutes of testing, we shut down the test.

Now, the particular materials used in this panel are really not practical cabin materials, as they are somewhat heavier than normal panels; they require higher curing temperatures and a longer curing temperature time. We are, however, benefiting from what we have learned here in the development and testing of practical panels—that is, panels which can be formed using conventional manufacturing techniques—and we will be testing a variety of these panels during 1984.

We expect improvement in performance over the current materials; however, we may not achieve the full increase in evacuation time that was provided by the "best of the lot," if you will, panel.

[Slide shown.]

This Vu-graph summarizes our major activities in the cabin fire safety area. It is included in the handout, and I think I have spoken to most of those, so we will skip to the next one.

[Slide shown.]

In the crashworthiness area, we will have a major activity in 1985 to reduce the data from the controlled impact demonstration and to use that data to calibrate our analytical models and to use those models to more accurately predict the transfer of loads from the aircraft structure to the multiple-occupant seats and to the seat occupants.

In the composite area, we will continue to obtain data and technical information needed for the certification process. It will also include data on nondestructive inspection techniques both for initial inspection and for inspection after damage has occurred.

The crashworthiness program will include an examination of technology transfer from what we have learned on the large aircraft to the smaller general aviation aircraft.

[Slide shown.]

Our propulsion program continues to focus on the effects—that is, the engine-damage effects—resulting from the ingestion of foreign material, particularly bird damage, surface materials damage, and effects of ingestion of large amounts of water.

In 1985, we will be focusing on the failure mechanisms within the engines to see what changes in engine design might be beneficial in reducing the number of engine failures resulting from, particularly, bird strikes.

In the flight safety program, we are continuing with our characterization of the atmosphere with a view toward updating our icing standards, 525 appendix C. Of note, an Icing Council was formed in February of 1984 with membership from FAA, DOD, NASA, Na-

tional Science Foundation and
derway in this area and to ma
changes in the existing progr
grams.

We are continuing our work
the past has focused on high a
tion and the effects on aircr
work in 1985 will focus on lo
effects on aircraft systems.

[Slide shown.]

In the security area, we hav
be completing specifications f
meet first generation threat re
ing during 1984 specifications
ic resonance, and x-ray absorpt

The focus of our 1985 work
detection of second generation
explosives, which are more di
teristic physical shapes, and a
er amounts.

The problem is extremely
search activity. In April of th
held to discuss what technolo
the second generation threat
niques were identified which
laser, optical, and acoustical a
of explosives and signature re
these techniques each year for
nation.

Thank you.

[Material follows:]

l NOAA to review the activities un-
ake recommendations on the possible
ams and the initiation of new pro-

t in the lightning area. The work in
ltitude cloud-to-cloud lightning detec-
aft structures and equipment. The
w altitude cloud-to-ground lightning

e reached a transition point. We will
or equipment which is designed to
equirements, and we will be publish-
on thermal neutron, nuclear magnet-
ion systems.
will be to look to the future, to the
n threats. These generally relate to
fficult to detect, do not have charac-
re very effective when used in small-

difficult and will require major re-
is year, an industry symposium was
gy could do toward the detection of
s. Several promising research tech-
nclude vapor detection by combined
nalysis, and fast neutron irradiation
ecognition. We hope to select one of
further experimentation and exami-

Aviation Weather

NEXRAD

- Developmental Test Site: Memphis International Airport
  - — Will Provide Active Airport Location for Developmental Testing, Data Acquisition, and Preliminary Operational Interface Evaluations for Terminal Configuration
    - Primary Test Director: MIT's Lincoln Laboratory
    - Evaluate On/Off Airport Siting Criteria and Guidelines for Terminal Applications
    - Evaluate Scanning Strategies, Data Processing, and Display Techniques
    - Test Site Established: June 1984
    - Testing and Evaluation Completed: December 1984

Aviation Weather

Long Term Improvements

- Central Weather Processor (CWP)
  - — Will Provide to Each Area Control Facility (ARTCC) a Capability to Manage, Synthesize and Disseminate Weather Information Throughout the National Airspace System. Will Be Focal Point for Aviation Weather Processing for CWSU Meteorologists, Air Traffic Controllers, FSS Specialists and Pilots.
    - System Capabilities Include: Radar Mosaicking, Satellite Image Overlay, Automatic and Interactive Manipulation of Weather Data, and Automated Data Dissimentation
    - Currently in System Specification and Functional Requirements Development Stage
    - First Prototype: Mid-1987
    - 26 Systems Planned With Field Implementation Between 1990 and 1992

Aviation Weather

Long Term Improvements

- Other Weather Related Programs
  - Mode S Data Link: for Direct Access to Weather Data
  - **Flight Service Automation System**
  - Improved Upper Wind Measurements
  - Improved Surface Observation Sensors
  - Improved Forecasting of Icing, Turbulence, and Winds Aloft
  - **Aviation Route Forecast: Route Oriented Pilot Weather Briefings**

PICTURE

MANNEQUINS ON 720

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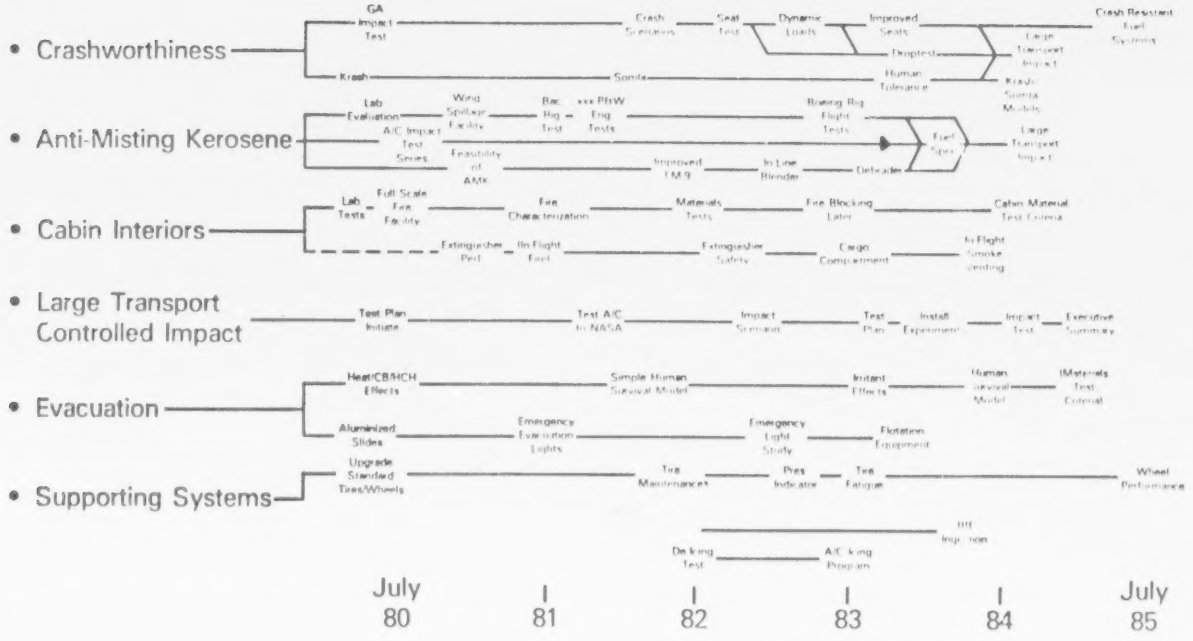
FY 1985 Aircraft Safety Program



FY 1985 Aircraft Safety Program

Regulatory Plans

Cargo Compartments	NPRM	Spring 84
Fire Extinguishers and Smoke Detectors	NPRM	Spring 84
Crash Resistant Fuel System (General Av.)	NPRM	Summer 84
Human Tolerances (General Aviation & Transport)	Advisory Circular	Winter 85
G/A Shoulder Harness	NPRM	Summer 84
G/A and Transport Seat Strengths	NPRM	Spring 85
Crash Scenario Models	Advisory Circular	Spring 86
Antimisting Kerosene	NPRM	Late 84
Interior Materials (Criteria and Test Methods)	NPRM	Late 84

Full-Scale Transport Controlled Impact Demonstration Program

Purpose and Objectives

Purpose:

- Demonstrate and Validate Technology That Can Improve Transport Aircraft Occupant Crash Survivability Through:
  - — Reduced Post-Crash Fire Hazard
  - — Improved Crash Impact Protection

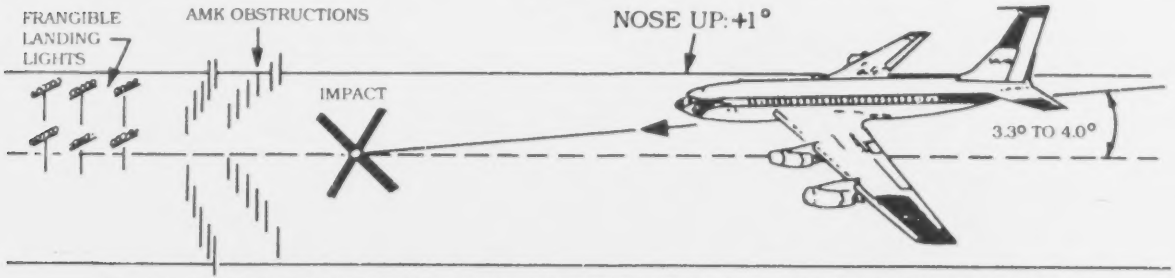
Objectives:

- Verify an Antimisting Fuel That Can Preclude Misting and Demonstrate an Operational Fuel/Propulsion System
- Acquire Structural Baseline Data in Order to Better Understand Transport Crash Behavior
- Demonstrate the Effectiveness of Existing Improved Seat/Restraint and Structural Systems

FULL-SCALE TRANSPORT CONTROLLED IMPACT DEMONSTRATION PROGRAM

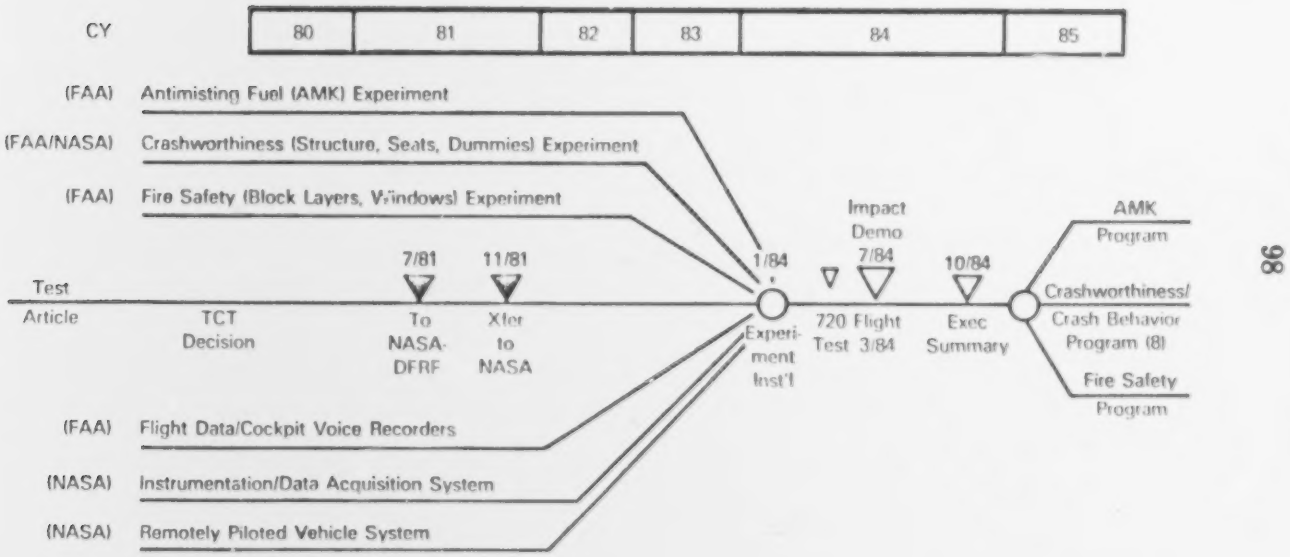
IMPACT SCENARIO

- REPRESENTATIVE OF: AN IMPACT SURVIVABLE ACCIDENT
- CRASH: AIR-TO-SURFACE; FINAL APPROACH/LANDING, MISSED APPROACH, AND/OR TAKEOFF ABORT
- AIRCRAFT CONFIGURATION: LANDING GEAR RETRACTED, FLAPS, SPOILERS (AS REQUIRED), SYMMETRICAL/STABILIZED
- SINK RATE: 17 $^{+0}_{-2}$ FPS
- LONGITUDINAL VELOCITY: 150 $^{+5}_{+0}$ KNOTS
- GLIDE PATH: 3.3° TO 4.0°
- GROSS WEIGHT: 175-195,000 POUNDS



IMPACT GOALS: AMK--WING TANK RUPTURE, 20-100 GALLONS PER SECOND PER SINGLE POINT RUPTURE , 4-5 SECONDS EXPOSURE WITH POSITIVE AMK IGNITION, SLIDE-OUT TO 100 KTS
CRASHWORTHINESS--SURVIVABLE IMPACT, MAINTAIN FUSELAGE INTEGRITY, VERICAL IMPACT PULSE (1 SECOND), LONGITUDINAL ACCELERATION DATA

Full-Scale Transport Controlled Impact Demonstration



FY 1985 Aircraft Safety Program

Controlled Impact Demonstration — Status

Completed

• Degrader Installation	2/84
• Crashworthiness Experiments Installed	2/84
• First 720 Flight	3/84

Planned

• Impact Demonstration	7/84
• Executive Summary Report	10/84
• AMK Final Technical Data Package	12/84
• Seat Restraint Technical Data Package	12/84
• AMK Regulatory Action	12/84
• Transport Seat Strength NPRM	Spring 85

FY 1985 Aircraft Safety Program

Antimisting Fuels

Objectives: Develop and Demonstrate Antimisting Aircraft Fuels (Related Systems) to Reduce the Severity or Eliminate Postcrash Fuel Fires and, Thus, Increase the Time Available for Evacuation

Approach:

• Determine AMK Feasibility	10/80
• 880 Degrader Flight Tests	2/84
• Demonstrate AMK Effectiveness	7/84
• Final AMK Technical Data Package Issued	12/84
• Regulatory Action	12/84

FY 1985 Aircraft Safety Program

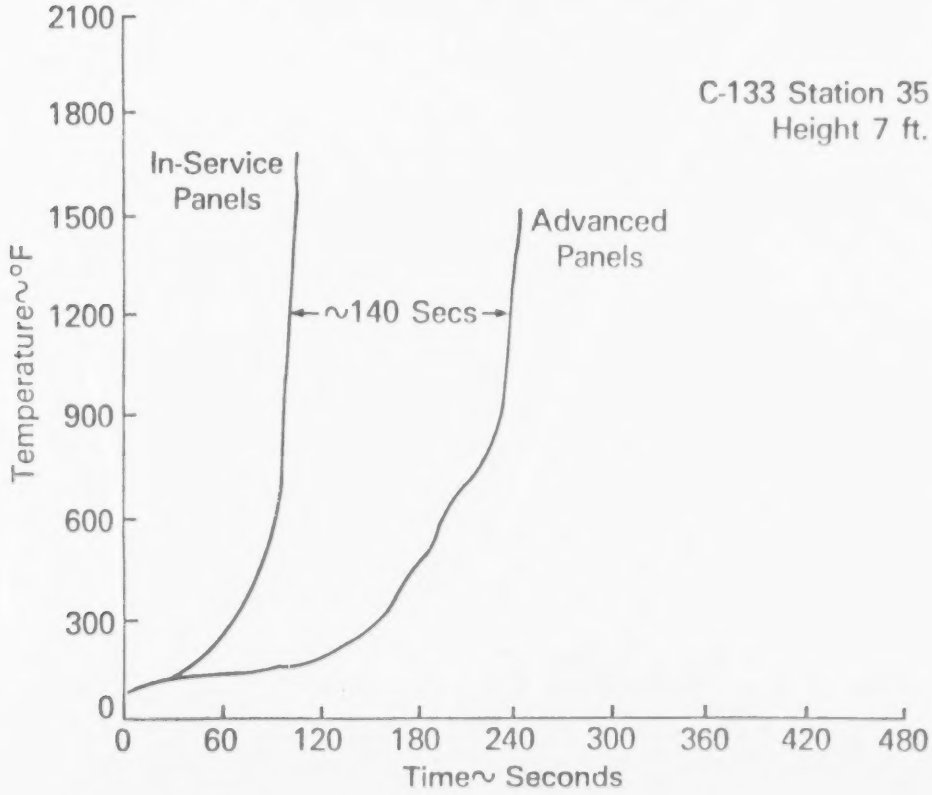
Cabin Fire Safety

Objectives: Increase the Survivability and Safety of Aircraft Passengers During Postcrash or In-Flight Aircraft Cabin Fires

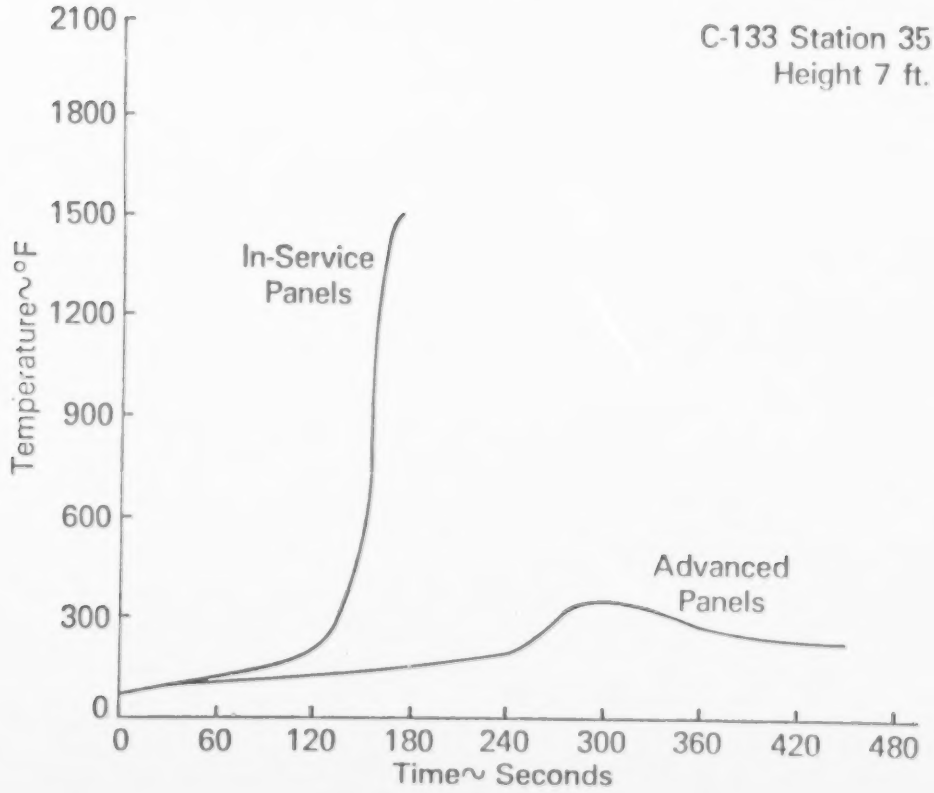
Approach:

- Develop Fire Test Methods and Criteria for Interior Materials
- Evaluate the Safety Benefits Obtained Using Improved Materials
- Determine the Effectiveness of Aircraft Fire Management and Suppression Systems
- Evaluate Improved Evacuation Aids

Benefit of Advanced Composite Panels— External Fuel Fire/Fuselage Rupture Scenario



Benefit of Advanced Composite Panels— External Fuel Fire/Open Door Scenario



FY 1985 Aircraft Safety Program

Fire Safety Milestones

Completed:

• Halon Extinguishers — Adv. Circ.	8/82
• Cargo Compartment — D — Data Package	3/83
• Seat Fire Blocking Layers — NPRM	10/83
• Cabin Emergency Lighting — NPRM	10/83
• Cargo Compartment — C — Data Package	3/84

Planned:

• Cargo Compartments — Liner — NPRM	Spring 84
• Fire Extinguishers & Smoke Detectors — NPRM	Spring 84
• Test Methods & Criteria for Interior Materials — NPRM	Late 84
• Initiate Full-Scale Evaluation of Optimized Advanced Panels	Early 85

FY 1985 Aircraft Safety Program

- Crashworthiness
  - Analyze Data From Full-Scale CID
  - Calibrate Analytical Models
  - Evaluate Relationship Between Multiple Occupants, Seat/Restraint Systems and the Basic Air Frame
  - Fuel System Protection
  - Structural Airworthiness (Composites)

Mr. ALBRECHT. Mr. Chairman, Mr. Frisbie's description of major RE&D programs takes about 10 to 15 minutes. Would you want to forego that or go into it, or what is your pleasure?

Mr. GLICKMAN. Why don't you go ahead? Maybe you could summarize it a bit; run through it as quickly as possible.

Mr. FRISBIE. All right, Mr. Chairman. Let me just go through these quickly.

[Slide shown.]

I think the committee is familiar with all of these programs.

[Slide shown.]

First is the automated en route air traffic control, that is, the software capability functions which will be added to the air traffic control computers.

You will see that we are establishing a test bed at the technical center for controller evaluation, and that is a near-term activity that will allow us to check out the AERA-I specifications and the man-machine interaction with those.

[Slide shown.]

In the mode S data link, we are approaching the award of a contract for 137 systems. We expect to award that contract in May 1984. That will give us the hardware for improved surveillance and for the communications capability associated with the data link.

[Slide shown.]

In TCAS, most of the engineering work is done in TCAS. We are working with the community in the development of the various standards and guidelines that are required. We are continuing to work with the aviation industry with respect to the limited installation program which will put units out into user aircraft for further evaluation and experience with TCAS.

[Slide shown.]

The voice switching and control system is a replacement for a system that is presently leased in our air traffic control centers. It turns out that that is a very complex job because there is no off-the-shelf equipment that exists that meets all of our requirements.

It is also a job that is critical to us because this equipment has to interface very closely with the advanced automation system sector suite.

[Slide shown.]

The en route conflict alert and resolution is another set of software functions, and these are software functions which are being developed now and which will be introduced after the implementation of the host computer.

[Slide shown.]

The prime flight service automation system is the contract which was awarded to E-systems in fiscal year 1981. Frankly, Mr. Chairman, the contractor has had some difficulty here. We are behind schedule. There have been problems with that software development.

The hardware is in good shape. We are optimistic about the software. We hope that we will get that software, coupled with the hardware, delivered to the technical center this summer, and that we can proceed then in a straightforward way to introduce that equipment into the field.

[Slide shown.]

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In the navigation area, our primary activity at this time is supporting the national navigation plan activities which Mr. Blake heads up for FAA.

[Slide shown.]

And finally, with respect to the microwave landing system, the ultimate replacement for the instrument landing system, we have awarded the production contract in January 1984. The first production deliveries are expected in fiscal year 1985.

We have also taken delivery of microprocessor receivers, which will allow us to work on the avionics side of the MLS. We have, as I think you know, some equipment installed, the early equipment which was purchased under the development contracts, and that has been used in user evaluations of the equipment.

Thank you, Mr. Chairman.

[Material follows:]

FY 1985 Aircraft Safety Program

- Propulsion
  - — Emphasis on Ingestion of Foreign Matter
- Flight Safety
  - — Atmospheric Icing Characterization
  - — Analytical Icing Methods and Simulation
  - — Icing Council Formed
  - — Atmospheric Hazards
  - — Digital Systems Reliability
  - — Rotorcraft Airworthiness

FY 1985 Aircraft Safety Program

- Security
  - — Specifications for Thermal Neutron, Nuclear Magnetic Resonance, and X-Ray Absorption to Meet First Generation Requirements End CY 84
  - — Second Generation Requirements
    - Vapor Detection
    - Advanced Technology Investigations

Other Major RE&D Programs

Automated En Route ATC (AERA)

Objectives:

Use Higher Levels of Automation in the Future System to Improve Safety and Efficiency

- Allow Pilots to Select More Fuel Efficient Routing
- Assist Controllers in Providing Conflict-Free Clearances
- Monitor Real Time ATC Operations for Potential Hazards and Overloads

Initial AERA Will Provide Planning Aids to Controllers (Early 1990's)

- Flight Plan Conflict Probes
- Conflict Free Metering Advisories
- Control Sector Workload Predictions

Later Capabilities Will Provide Traffic Management Aids (Mid-1990's)

- Resolution of Potential Conflicts
- Routing Around Severe Weather
- Use of Data Link for Clearance Delivery

Status:

• Establish Test Bed at ACT — Controller Evaluations	9/84
• AERA 1 Specification Completed	9/84
• Complete AERA 2 Specification	3/86
• Complete Operational Suitability Evaluation of AERA 1	11/86

Mode S/Data Link

Objectives:

To Provide the Improved Surveillance and Communications Capabilities Required to Meet the Need of Automated Air Traffic Control (ATC) in the 1980's. Specific Goals Are:

- Overcome Surveillance Limitations of the Present ATC Radar Beacon System (ATCRBS)
- Provide an Integral Two-Way Data Link
- Evolutionary Transition From the Present System
- Reasonable Cost to the Airborne User
- High Availability and Reliability

Status:

Mode S/Data Link Equipments

F&E	PR/Spec. to ALG	FY 1983 Completed
	Contract Award	May 1984
	First Delivery (Test)	FY 1987
	First Site Delivery	FY 1988

Data Link Activities:

RE&D	Draft National Standard	June 1983
	Begin ICAO Standard Development	February 1984
	Final National Standard	April 1987

Specific Message Applications Being Developed With Originating Programs — AERA, Weather, Etc.

Traffic Collision Avoidance System (TCAS)

Objectives:

To Provide an Aircraft Separation Assurance Backup to Normal Air Traffic Control Operations, ATC Surveillance Coverage, and Primary Separation Assurance Outside ATC Surveillance Coverage.

Status:

• Design Guidelines for TCAS I (Final)	FY 1982 Completed
• Engineering Model, TCAS II Delivery	FY 1983 Completed
• OST Concurrence	FY 1983 Completed
• MOPS, Minimum TCAS II RTCA (Final)	March 1984
• National Standard, Minimum TCAS II (Final)	April 1984
• Contract Award for TCAS Operational Deployment (LIP)	June 1984
• MOPS, Enhanced TCAS II (Final)	January 1985
• National Standard, Enhanced TCAS II	February 1985
• User Operation/Evaluation Report (TCAS I)	Summer 1986
• Complete TCAS Operational Deployment (LIP)	November 1986

Mr. GLICKMAN. Does that complete your presentation?

Mr. ALBRECHT. That completes our formal presentation, Mr. Chairman.

Mr. GLICKMAN. Mr. Albrecht, I have a list here prepared by my staff, a variety of the RE&D proposals of the FAA, both the NAS related as well as a lot of the things you testified about today, and it looks to me as if there has been time slippage in almost every one of the proposals, from the MLS, which—some of them are not very long. Some of them are 3, 4 months, 6 months in some cases. But you run through the whole system, MLS, TCAS, mode S, AWAS, and then you go through the aviation safety notice of proposed rulemaking schedule, and it has also slipped in some degree. Again, in some cases it is not dramatic, but it is 3 to 6 months in many cases.

I wonder if you have any comments or explanations for this.

Mr. ALBRECHT. Well, Mr. Chairman, on Monday we said we were essentially on schedule on most of the NAS plan programs, and I think this is really true. Some of those slippages, you may notice, are slips from one fiscal year into the other, and part of that was programing those programs because of funding availability, but basically, the programs, we think, are in reasonably good shape.

The NPRM schedules and the regulatory issues I cannot address specifically in that our job is to provide the underlying research and development that the aviation standards people then take, produce the rulemaking paperwork, so in some cases, because of interaction with the community, that schedule takes longer than was proposed.

I think the serious schedule slips we have tried to keep the committee apprised of. We talked about the host and the reason for that the other day. Frank mentioned the flight service station software problem, which has been real, and our intent is certainly to let you know if there are any serious schedule slippages that really impact the NAS plan.

Mr. GLICKMAN. All right. Well, I am concerned about that. I probably have just as high if not a higher concern about some of the regulatory schedules on the aviation safety side of the picture, where this subcommittee issued a committee report 6 months ago or so that was highly critical of the time lag between research programs and regulatory changes in cabin fires and a variety of other things which were evidenced by some of the accidents which have occurred.

I guess I have some concern because until such time as we get a new FAA administrator, I would fear that there might be lack of commitment to move ahead on the regulatory side as quickly as possible, particularly in the aircraft safety area.

Mr. ALBRECHT. Well, let me address that general notion, Mr. Chairman. If there is any word around the FAA these days, it is "Don't let up, don't stop, keep going." That is exactly what we are trying to do.

We understand the desires of the new administrator. We thoroughly understood Mr. Helms' desires. The schedule that Neal showed you on the overall safety program is one that was derived because of the criticism on delays, and we intend to do our best to maintain that schedule. There is really no letup, believe me.

Mr. GLICKMAN. All right.

I want to run through a few of these things individually. First, on the MLS, what is happening on developing curved approach capability with the MLS?

Mr. FRISBIE. Thank you, Mr. Chairman.

The aviation standards side of FAA is working on collecting the data for developing what are called the TERP's, the terminal procedures which are required for curved approach. So that activity is ongoing as part of our research and development program.

Mr. GLICKMAN. When do you think it would be available for civil use, like at National Airport?

Mr. FRISBIE. I think, Mr. Chairman, that probably at National Airport, the application would be a segmented approach which will be available earlier. A segmented approach is one that would have several straight-line segments, and that capability is easier for the airborne equipment; it is easier for the pilot to monitor; it is within the capability of the MLS to deliver, and I think that is the first thing that the avionics manufacturers will be offering.

Mr. GLICKMAN. When do you think that would be available?

Mr. FRISBIE. As far as the TERP's are concerned? Let me see if Marty knows.

Mr. POZESKY. 1986, Mr. Chairman.

Mr. GLICKMAN. I am going to tell you something: I don't care what you all say. I think that the—I realize there has been some improvement on approaches coming into the south of that airport, but I fear there is going to be an accident there, and I want to see that approach improved, and I know you do, too, and nobody wants anything catastrophic to happen, but the margins are too close on that approach coming in to the south at that airport, and there are too many other constraints that are unrelated, like noise restraints and things which cause planes to go in directions they ordinarily would not have to.

And so I would urge you to move ahead as quickly as possible. At the same time, you don't want to get a system on that isn't technically feasible, either.

Mr. FRISBIE. Mr. Chairman, I think we have taken a giant step forward with the award of the production contract, because until that time, avionics manufacturers were reluctant to commit to designing the airborne equipment to complement the ground station. So with the award of the ground station contract, we have seen considerably more interest on the part of the avionics folks to move in that direction, and as I said, FAA is moving to develop the criteria which will allow the use of those procedures.

Mr. GLICKMAN. What about user views on the MLS?

Mr. FRISBIE. The users, Mr. Chairman, are interested. I think there are some users who think that they need precision landing guidance sooner than we can deliver it with respect to the MLS. We expect that the user community will be sending us a letter in the very near future indicating, urging us to accelerate the MLS program. At the same time, there is some interest in the user community for some additional ILS's.

Mr. GLICKMAN. At one time, there was a discussion about the development of a low-cost MLS. How is that moving?

Mr. FRISBIE. The FAA is not subsidizing the development of a low-cost MLS. The MLS which we have decided to buy for Federal implementation, the one which will eventually go into all the locations—where we now have ILS, and some additional locations for a total of 1,250—is a standard design which we feel that the life cycle cost benefits to FAA in terms of the way it would be maintained and the way it would be logistically supported is a good tradeoff against a no-frills ground station, if you will.

But the non-Federal sector is out there. There is a market for the stand-alone, low-cost MLS, and I think that is available. The technology has not changed, and that is still available.

The prices that we are paying on the contract that we have just awarded are $650,000 per location. That is $505,000 for the equipment, which includes a precision DME. So I don't know what the quantitative cost of the PDME is, but let me estimate that that is $100,000, so we are talking about a $400,000 ground station. This is the first production award. I would expect those costs to come down further.

Mr. GLICKMAN. Let me move to the issue of fire safety. I mentioned this to you all before about slippage. Why has the schedule for the NPRM for less flammable cabin materials, why did it slip from the fall of 1984, as Administrator Helms announced, to the spring of 1985?

Mr. BLAKE. We are still planning to put the notice out in the fall of 1984. What we are doing in the spring of 1985—or perhaps I should preface this. We are also testing during 1984 eight different advanced cabin panel materials which we believe are practical ones to manufacture.

We will select the best of the lot and test that in a full-scale cabin environment in the spring of 1985. We will not need to wait for that test in order to go ahead with the rulemaking, so the plan is still late 1984.

Mr. GLICKMAN. You mentioned the antimisting fuels and the performance of the one engine that runs on those. Do you think there are going to be any engine modifications necessary to run on these fuels?

Mr. BLAKE. There are several engine modifications. One is the installation of a fuel degrader. Second is the selection of the appropriate filter size, not replacement of the filter but selection of the proper element to be compatible with the fuel, and possibly some changes in the jet pumps used to transfer fuel, particularly in the fuel tank scavenging system.

We have looked at all of those, and we will be demonstrating, and are demonstrating, in the Convair 880 tests and in some of the simulator tests run at Boeing and McDonnell Douglas, and of course we will be demonstrating those again on the 720 as actual operating systems.

Mr. GLICKMAN. When do you anticipate you will resolve all of the problems that you think you need to on the research side on this issue of the antimisting fuel?

Mr. BLAKE. I believe we have reached the point where we will essentially, through the 880 tests and the 720 tests, demonstrate all of the systems—in the case of the 880, throughout the full flight

Voice Switching and Control System (VSCS)

Objectives:

Develop a Voice Switching and Control System Which Can Provide the Flexible Communication Operations Necessary to Complement Sector Suite Flexibility in ARTCC's/Area Control Facilities (ACF). Implementation of VSCS Will Increase Operational Flexibility, Reduce Leased Line and Equipment Cost, Reduce Maintenance Costs, and Enhance Controller Productivity.

Status:

Specification Completed	March 1984
Contract Award	September 1985
Production Award	FY 1988
First Site Operational	FY 1990

En Route Conflict Alert and Resolution

Objectives:

This Software Enhancement Extends the En Route Conflict Alert Functions to Include Cases Where IFR Aircraft Are Approaching Potential Conflict Situations With VFR Aircraft That Are Equipped With Altitude Reporting, Mode C Transponders. Also Will Provide Automation Aided Assistance to En Route Radar Controllers in Resolving Potential Conflicts When Violation of Separation Minima Is About to Occur.

Status:

Integration Testing Completed	December 1983
System Test Completed	February 1984
Technical Data Package Completed	July 1984
Design Evaluation Completed (AAT)	December 1985
First Host Site Implementation	July 1987
Last Host Site Implementation	December 1987

Flight Service Automation System (FSAS)

Objectives:

Develop an Automated Flight Service System (FSAS) to Replace the Existing Manual Flight Service Station (FSS) Operation. Implement Flight Service Data Processing Systems (FSDPS) at 23 ARTCC's and Establish 61 Automated Flight Service Stations (AFSS). Full Implementation Will Meet the Projected Increase in User Demand and Also Reduce the Cost of Individual Services.

Status:

F&E	Contract Awarded to E Systems (Models 1 & 2)	FY 1981 Completed
	First Delivery FAA Tech Center (Model 1)	July 1984
	First Operational Site Delivery (Model 1)	October 1984
	First FSDPS Site Operational	April 1985
RE&D	Contract Award Model 2 Enhancements (Package 1)	December 1984
	Enhancement Package 2	December 1985

Navigation

Objective:

To Quantify to the Extent Possible the Performance of Candidate Systems in the Areas of Accuracy, Reliability, Integrity, Coverage, and Operational Suitability to Facilitate Comparisons to Established Performance Standards.

Status:

Joint Preliminary DOD/DOT Recommendation for Future Radio Navigation System	April 1984
Draft National Standard for Loran-C	September 1984
Draft National Standard for NAVSTAR/GPS	September 1985
Publish Joint DOD/DOT Recommendations for U.S. Provided Radio Navigation Systems Mix	September 1986

Microwave Landing System (MLS)

Objectives:

Develop and Implement a New Common Civil/Military Approach and Landing System That Will Meet the Full Range of User Operational Requirements Well Into the Future and Be Selected for International Standardization as the Replacement for the Current Instrument Landing System (ILS).

Status:

F&E	ICAO Approval of Angle/Data SARPS	FY 1981 Completed
	Avionics TSO Issued	FY 1982 Completed
	ICAO (AWOP) Approval of DME/P SARPS	FY 1983 Completed
	Key Decision Point #4 Approved	FY 1983 Completed
	Contract Award	January 1984
	First Production Delivery	FY 1985
	First Network Commissioned	FY 1986
RE&D	Complete Delivery of 20 (CHIP) Receivers	May 1984
	Complete Evaluation Reports for STEP	June 1985

environment. The testing to date has shown no difficulties with that equipment.

So I think, from a research standpoint, we are pretty well toward the end of the road and will complete that activity this year.

On the fuel blending side, we have made substantial improvements and are able to do inline blending instead of the two-step blending that we talked about several years ago, and the fuel will be ready for use 15 minutes after loading in the tank, so we feel we have a practical method of ground handling and fueling of aircraft.

Mr. GLICKMAN. Do you anticipate any regulatory action as a result of this?

Mr. BLAKE. We are going to publish a Notice of Proposed Rulemaking in essentially December of 1984 which will encapsulate the results of all of the technical work and then, of course, take it through the full notice process, the coordination with the users.

Mr. GLICKMAN. What is the general proposition with that rulemaking? I mean, would it mandate the use of this fuel?

Mr. BLAKE. It would cover the use of this type of fuel, yes, in transport category aircraft.

Mr. GLICKMAN. Are you anticipating mandating the use of this fuel?

Mr. BLAKE. Well, the notice carries that implication, sir. As a part of the process, we do have to coordinate with the user community on the potential use of the fuel, and the decision to mandate or not to mandate is made after the response to the notice comes back to FAA.

Mr. GLICKMAN. I realize that, but I mean, you could theoretically come out with a couple of different ideas in this area. One is, you could say this kind of fuel is safe and we hereby indicate that it is safe, and do it by a rulemaking procedure; or you, by a rulemaking procedure, could say that from henceforth, as of a certain date, this kind of fuel will be used.

I am just trying to get a feel for where you think you are going to moving in this area.

Mr. ALBRECHT. Luckily, that is one of the decisions the new administrator gets to make, Mr. Chairman. As you know, it is a matter of judgment, economic factors, a number of things that come into that judgment, and right now I really wouldn't predict how that will come out.

Mr. GLICKMAN. But you are saying that from an R&D point of view, you think, Mr. Blake, that you will have solved all of the problems?

Mr. BLAKE. We will have demonstrated operating systems which we believe are adequate to handle this type of fuel. Results have been very good. We have already, through flight tests, looked at some of the most difficult questions that had bothered us in previous years. The results have been good.

Mr. GLICKMAN. Do you have any idea what the cost will be to modify—you said you may need a new filter; there may be some additional things that you may need. Do you know what the cost would be?

Mr. BLAKE. I have only very, very preliminary numbers that the average modifications per engine are somewhere in the order of $50,000 to $75,000. That is existing engines. Now, if you start with

a new engine, then, of course, you couldn't find the difference in cost.

Mr. GLICKMAN. Yes.

Mr. ALBRECHT. But there are other costs. There is the cost of the additive; there is the cost of the ground plant. So there are other things to consider in that total decision.

Mr. GLICKMAN. Yes. All right.

I want to move to the issue—I am kind of skipping around here because there are a lot of different subjects. On the crash demonstration you talked about, is the test plan and schedule for the controlled aircraft crash program agreed to by all the participants?

Mr. BLAKE. Yes. Yes; it is, and it has also been briefed to the aircraft industries.

Mr. GLICKMAN. Moving on to wind shear, have you considered onboard wind shear detection using forwardlooking temperature sensing techniques?

Mr. BLAKE. We have looked at a number of techniques—forwardlooking temperature or infrared sensing, use of lasers, and the use of doppler radars.

We have no fully successful system, although such systems as existed at the time of the JAWS program were in fact tested there.

What we are trying to do now is to work with NASA on the development of improved systems, particularly what could be done in the near term to modify existing airborne doppler weather radars for improved detection of shears.

We will be looking also at some airborne devices which are being developed by the Air Force, and these are laser devices which would look ahead of the aircraft and give you perhaps 20 to 30 seconds' warning of a disturbance.

Mr. GLICKMAN. Let me move on to the question of icing for a moment. This is one of these programs that I have a feeling there has been a lot of work going on over many years—NASA, you, universities—and that there has not been much in terms of technology improvement. I wonder if you might comment on that.

Mr. BLAKE. Yes. As I mentioned during the testimony, we have set up an Icing Council at the Federal level and we have invited and received participation from the five agencies that I mentioned.

Our purpose in doing that is to review all of the technology and all of the programs currently under way that address the question of icing of aircraft and also the forecast of icing conditions.

Now, that process has started. We have had our first meeting and we plan a series of follow-on meetings throughout this year. At the end of the year, we will be publishing a national icing plan which will summarize not only the programs themselves but also the facilities and the need for further facilities for both research and for certification. So it will be a fairly broad look at the question.

Mr. GLICKMAN. Well, is one of the things to be looked at whether there ought to be some sort of a standard for icing mix at airports for airplanes, the actual mix of whatever solution is used? As I understand, today it is still left up pretty much to the particular carrier to decide.

Mr. BLAKE. Yes. Several years ago, we did some research at Eglin Air Force Base in their cold facility, where we looked at the rate of

ice buildup on structures under various temperature and also precipitation conditions, and with different types and concentrations of the deicing fluid.

Our conclusion at that time was, there is no simple recipe which guarantees you success. I think we have some general guidelines which we have passed on to the operators in the form of an advisory circular recommending certain concentrations as a function of outside temperature, and those have worked very well.

So it is now mostly a matter of policing; that is, the airline policing its operating procedures to see that the deicing is conducted not more than 45 minutes before flight time; that there is an inspection of the aircraft wing before takeoff to be certain that it is clear.

We have not found any new materials which offer any improvement on the deicing of aircraft.

Mr. GLICKMAN. When we had testimony last year and the year before, Mr. Carney suggested, as well as others, that we consider having some sort of a spotter at the end of the runway to look at an airplane before it takes off, because you might have 20, 25 minutes of time elapse when a pushback occurs in takeoff. Is that still being contemplated at all by the FAA?

Mr. BLAKE. We believe the procedures that are in effect, and our reiteration to the aircraft operators of the necessity to follow those procedures, provides adequate protection, and I don't believe spotters are needed.

Mr. GLICKMAN. The problem is that at some of your major airports where there is a lot of congestion, airplanes sit on the ground for a long time after pushback, and the tendency is not to want to go back and be deiced again, unless you had a deicing truck at the end of the runway, and I just hope that this is one of the considerations that you keep in mind and show a little flexibility on the issue.

Mr. BLAKE. Yes.

Mr. GLICKMAN. I am not saying you mandate a little hut at the end of the runway where somebody looks at the plane and will deice it again, but I am also saying that it may not be a bad idea at some times.

Fortunately, we are getting ourselves out of that weather period now, and you have some time to look at it.

Mr. BLAKE. Right.

Mr. GLICKMAN. I think the airlines have been very sensitive to the issue after the Air Florida crash, and you have, too, obviously. I sense, though, that this is one issue where there hasn't been much technology advancement in the last 20, 25 years.

Mr. BLAKE. We will be looking at that as a part of our overall review of the whole icing program, and certainly we are looking for better ideas. But, as a result of the stepup in the advisory circulars to the operators and their policing things, this winter we have not had a problem.

Mr. GLICKMAN. Yes, and we have actually had an easier winter this winter, too, weatherwise.

Moving ahead for a moment to TCAS and mode S, will the TCAS program and others such as mode S be audited by the SEI contractor?

Mr. FRISBIE. Mr. Chairman, the TCAS program almost uniquely will not be audited by the SEI contractor because there is no production component in that program. So, since it doesn't have an F&E portion, if you will—if you remember the chart I showed the other day, they are not involved in that. But they will be involved in the mode S program.

Mr. GLICKMAN. But you don't see any problem in terms of the implementation of TCAS as a component of the larger program by its not being audited by the SEI contractor?

Mr. FRISBIE. No, Mr. Chairman. In fact, by its very nature, it is independent of the ground system; it is a stand-alone. And so it gets intense surveillance within the FAA, but it is not part of the SEI's job.

Mr. GLICKMAN. What are the latest cost estimates for TCAS user equipment?

Mr. FRISBIE. The numbers that I have, Mr. Chairman, are $45,000 for a minimum TCAS–II, the air carrier equipment, and $3,200 for a TCAS–I.

Mr. GLICKMAN. And what about the cost for the mode S user equipment?

Mr. FRISBIE. The mode S avionics, we believe, is a $2,400 item for general aviation, solid state.

Mr. GLICKMAN. All right. One final question before I go to someone else. Mr. Boehlert has been quite patient in listening to me talk.

We are entering into the spring and summer weather patterns in this country—tornadoes, severe thunderstorms—and I am wondering what, if anything, the FAA is doing different this year than it might have been doing in previous years to gear both its research activities as well as its operational activities to this perennial weather problem.

Mr. BLAKE. Well, I think we are doing several things in the near term. We are providing additional frequencies for the en route flight advisory service to reduce the frequency congestion and provide better access to severe weather information by airborne pilots.

We are also expanding our HIWAS program. This is a program to broadcast over the VOR's significant weather information and to update this information perhaps as much as three times an hour, so it is a big improvement in the quality of the information and also in the availability.

These represent perhaps the two major near-term things that will offer improvement.

Mr. GLICKMAN. Let me just mention a couple of things. One is that the currency of information, the relevance of it, is still something that I hear repeated complaints from pilots on. They get old information. Now, some of this may be their problem or their carrier's problem, but I just want to make sure that the availability of information to a pilot is very current, and sometimes a pilot will tell me that—let's say we take off and we land—he is giving us 6-hour-old information as to what is at that terminal. Is that his problem? Is that his carrier's problem? Or is that your problem?

Mr. BLAKE. Well, I think it is both our problem and his carrier's problem. They have a responsibility for establishing within the airline a weather dissemination system. And it is one of the areas

that we placed extremely high priority on through these new services that we are introducing, to get the more current information out to the pilot in real time.

A second effort which I had mentioned in the testimony was to improve the whole forecast process. One of the things we are doing there is to utilize our center weather service unit meteorologists, who have the radar picture, or will have the radar picture in front of them by about June of this year. They will be able to give much better real-time weather information to the control staff and also to the flight service stations on where the storms are right now, and this will be, I think, a tremendous improvement in the currency of the information.

Mr. GLICKMAN. Now, will that be available at all the centers?

Mr. BLAKE. Yes.

Mr. GLICKMAN. All right. What about the towers themselves? You know, one of the problems that I have had some concern about is that once the center hands the pilot over to the tower—10 miles out or wherever that airplane is—that is one of the places where the airplane is least able to deviate around storms.

I recall that there was some advancement of radars at some of the tower centers, like at Atlanta or Chicago, maybe, where a tower controller could look at the planes and could superimprose the weather on top of the planes. Are you doing anything in that regard?

Mr. BLAKE. Yes, we are doing, I think, a number of things. We will be looking at putting National Weather Service weather radar information in a tower on a test basis to see if that helps the controllers.

The ultimate solution, though, we believe, is to take the processed radar data, which will come from NEXRAD and possibly a terminal variant of NEXRAD, process it into severe weather contours, and put that directly on the control scopes in the tower as well as on the control scopes in our centers.

Mr. GLICKMAN. Yes.

Mr. BLAKE. And that, I think, is the final and the correct solution for getting real-time information.

Mr. GLICKMAN. And what are we talking about timewise when that kind of thing would happen?

Mr. BLAKE. For the en route radars, we are talking the late eighties, early nineties, time period. We are hoping that we can extend that capability into some of the terminals and are still working on a plan to do that.

Mr. GLICKMAN. Do you have anything more on that?

[No response.]

Mr. Boehlert?

Mr. BOEHLERT. Mr. Chairman, you have preempted my questions in just about every area.

I would like to thank the panelists for a thorough report and a comprehensive program. I am going to be analyzing what has been delivered here today, and perhaps I might have some questions later on.

Let me ask Mr. Albrecht, if it would be appropriate, this report I have before me is a report that was submitted to the Hill in Octo-

ber. It is the planned office and facility consolidations. Is this something you are familiar with?

Mr. ALBRECHT. Yes, it is, Mr. Boehlert.

Mr. BOEHLERT. Would questions about this report be appropriate right now, because we are talking about—I am particularly interested in your plan for the airway facilities sector office consolidations. I am assuming that is—it says here, at least—to improve system efficiency and effectiveness. I also assume we are talking about saving some dollars and cents. Is that correct?

Mr. ALBRECHT. Yes; Mr. Boehlert, and Mr. Pozesky would be glad to address that question.

Mr. BOEHLERT. OK, fine. Maybe we should talk immediately after this, because I have a particular interest in this, and I wouldn't want to take everyone else's time up with my line of questioning. But I think we can work in partnership to save you some money and improve your efficiency and effectiveness.

Mr. ALBRECHT. Fine, Mr. Boehlert.

Mr. BOEHLERT. Thank you. May I see you, Mr. Pozesky?

No further questions, Mr. Chairman.

Mr. GLICKMAN. Thank you.

Mr. McCandless?

Mr. MCCANDLESS. I apologize to the subcommittee chairman and the gentlemen. I had a prearranged 29-student group from Palm Springs over in the Capitol Building that had been put together some months ago. I am sorry that I was not able to be here.

At this time, Mr. Chairman, I do not have any questions.

Mr. GLICKMAN. Thank you. I am sure that Palm Springs is appreciative for what you did.

Mr. MCCANDLESS. They have a very nice airport there.

Mr. GLICKMAN. I know.

Mr. MCCANDLESS. It is run by the Federal Aeronautics Administration.

Mr. GLICKMAN. I landed there once myself and have taken off there once.

The work that was done on microbursts, which was fairly novel research that people hadn't anticipated before, has that word gone out to the users of this country, to the aviation community, to the pilots of America, so that they have some technical understanding of what microbursts are and how they can be avoided?

Mr. BLAKE. Yes. We have distributed information in a number of ways. We have a training film which has been widely distributed to fixed-base operators and airline operators, and that film has been updated to encapsulate the latest information that came out of the JAWS program.

We have been also getting the profile data from JAWS directly into the airline training programs, and there is an industry-airline-FAA committee at the moment working to see how best to take what we have learned out of JAWS and convert that into training scenarios for use in the aircraft simulators.

I recently went down to Eastern Airlines to examine the type of wind shear profiles they were using for training; have gone through their total training curricula; have made some suggestions for how that might be improved. They are also looking at airborne detection equipment which would help the pilot in both detecting

that he was getting into a shear and in aiding him in flying through that shear. So there is a tremendous amount of interface between us.

We also have updated our advisory circular which describes in some detail the microburst phenomena and pilot procedures for dealing with it if they inadvertently get into one. So there has been a tremendous increase in the dissemination of that information.

Mr. GLICKMAN. Well, again, I mentioned the tornado season, but that is also the microburst season as well, and I am particularly concerned about this in the GA community. Again, Eastern Airlines has a lot of resources that some small fixed-base operators and general pilots do not have, and I just want to make sure that you do what you can to disseminate the information through not only the carrier community but APOA and GAMA and everybody else who might be needing to read it.

Mr. BLAKE. Well, they have been very helpful in taking some of the information we have provided them and putting it out in their publications.

Also, in the simulator activity, we are not looking just at air carrier aircraft; we are taking it all the way down to the simplest simulator that could run any kind of wind shear profile, so that will provide training through a large part of the general aviation community.

Mr. GLICKMAN. Let me close with some questions on GPS, the global positioning system, satellite navigation. This is something that has kind of intrigued me for a while because of the precision capability of satellite navigation; also the fact that it does not seem to have been built in very much into the NAS plan, perhaps because of technology development as of the current time. But what is the latest on GPS, and are you at the FAA giving it any serious consideration?

You know, after the Korean airliner straying, we held a hearing here in this subcommittee, and we had Pan Am's chief pilot for the Far East; we had a variety of people, technical people, and I think we had the FAA as well. There is no question that satellite-based navigation would have been able to more precisely locate that airliner and perhaps have warned him that he was so far off course, even if he were negligent in how he was flying and where he was flying that airplane.

So I have an interest in it, and I just want to know where you are on it.

Mr. BLAKE. Well, as you know, Mr. Chairman, we have, over the past several years, been studying the role of GPS as a function of the various configurations that have been studied by the military.

We have also conducted the research and testing on several receivers, a military receiver and one which we developed specifically for general aviation. The results of those tests have been very good. We have seen performance of about 70 meters' accuracy throughout our flights along the east coast.

So far as use in the system, we have done those things which need to be done in order to write a standard for avionics equipment, and we will be asking the Radio Technical Commission for Aeronautics to start a MOPS activity—that is the definition of the

minimum operational performance standards—for a GPS receiver starting in about 1 year from now.

So far as the military constellation, as you know, we have had some five problems in certifying GPS as a sole-means systems. One of those, the accuracy has been finally resolved with a military agreement that they will make 100-meter accuracy available to civil aviation. We believe that is sufficient.

The second problem that was addressed was availability. We were worried, as was the civil community, with military control of the system, would it be available at all times for civil use, and the President's announcement after the Korean airline accident has given us the assurance I think we need, which essentially says yes, it will be available except in times of direct national emergency.

The third one—and it is a major one—is the question of user charges for GPS. We believe that if civil aviation uses it, we have, under our current legislation, a method of remunerating for the cost of such use through the use of trust fund moneys, and we do not favor a special user assessment; in fact, it is contrary to our current legislation.

We have two additional considerations which we have been working with the military on very hard, and that is the question of coverage and integrity. Coverage relates to the fact that in order to provide full coverage and reasonably straightforward avionics, we really need 24 satellites and 3 spares. The current plan, due to budget restrictions, is 18 satellites and 3 operating spares. This does leave some areas where there is not complete navigation coverage and raises concerns that some of those areas may be in the domestic airspace if a satellite should fail.

That is a continuing concern. We are looking at what might be done—and this is a joint study with the military—what might be done in the way of providing additional capabilities in the avionics such as use of altimeter inputs, use of precision clock, to bridge these gaps. We have not completed that study. It appears it may be feasible, but, of course, it does increase the cost of the avionics set.

Perhaps the most serious one is the question of integrity. All of our current systems have monitors built into them such that the pilot is warned within 10 seconds if any signal becomes unreliable, and this is absolutely essential if you are to use that type of navigation in the terminal area or for making a nonprecision approach.

The monitor system that is currently planned for the global positioning system can detect—and, on an emergency basis, correct—a satellite which is radiating out of tolerance systems about 15 minutes after the detection; so 10 minutes to detect, 5 minutes to correct.

We have no solution to that problem at the moment, but we are studying it and we are working with Defense to see what methods could be determined to monitor the signal. If we are not able to do that, I think we probably would not recommend its use in the terminal area or for nonprecision approaches.

With regard to equipment costs, we had set for ourselves a goal several years ago—and that was before inflation raised the price of everything—we had set a cost goal of around $2,500, and I don't know what that is in today's dollars, but it is probably at least twice that.

Our current examination of what an avionics set might cost, with the additional capabilities built in to compensate for the lack of an adequate number of satellites, is about $10,000. In production, if we use a standard learning curve, this could come down to $8,000. And that is about the current status.

So far as use of the system is concerned, we are proceeding with the standards activity I mentioned and would be in a position to entertain certification of GPS receivers on a supplementary-use basis in 1988 when the GPS system becomes operational. Supplementary simply means that you would also have to have on-board some other navigation equipment that you could revert to should there be a failure in the GPS system, either detectable or undetected.

And I think that is about where we stand. We will be ready to certify on a supplementary basis in 1988, and we are working with Defense to see if there is a possibility of certifying on a sole-use basis either with the current configuration or with an augmented configuration, which I think we strongly recommend.

Mr. GLICKMAN. I think that that was a comprehensive answer and a good answer. I don't want to see that the FAA's desire to push ahead with its NAS plan, which I support, in any way interfere with the acceptance of a satellite-based navigational system if that should be deemed to be appropriate given—both either on a supplemental or on an exclusive basis if it is the best way to find where airplanes are.

Mr. ALBRECHT. I think in the past, Mr. Chairman, we were perceived as dragging our heels a few years ago, and this was really when the issue was, do we replace everything we now have with GPS?, which we didn't think was such a good idea.

But, on the other hand, we are ready to accept GPS, as Neal indicated.

Mr. GLICKMAN. Yes?

Mr. FRISBIE. Mr. Chairman, just to remind you, I believe I testified the other day that we have included in the NAS plan en-route monitors for GPS, so we have a plan, provided that the reservations that Mr. Blake talked about are resolved; that we could participate in the monitoring so as to make it more available for civil aviation.

Mr. GLICKMAN. All right. Well, this has been a good hearing and a useful one in terms of your updates.

Recently there was an editorial cartoon in one of the papers making light of FAA's regulatory action. You may have seen it. I can't recall which paper it was in. Basically, from what you have told us today, I think that you are proceeding well on the areas, and it looks like Secretary Dole is pushing you very strongly in a variety of aviation safety-related issues.

Yes, Mr. McCandless?

Mr. MCCANDLESS. Mr. Chairman, I don't want to go over ground that has already been covered, but during our discussions here this morning, did we talk about the time line of our system of intercontinental navigation for purposes of—not navigation, but air controlling, the new system? Did we get into that?

Mr. GLICKMAN. Yes. They testified on Monday on the spending goals, the times, and everything else.

Mr. McCANDLESS. All right. Thank you.

Mr. GLICKMAN. So they did a pretty comprehensive job of that. One thing they did testify to which we may want to talk about here is that in connection with the budget, there are a couple of budget proposals, more emanating out of my party than yours, which would call for either a program freeze or spending reductions which would affect trust fund programs like the FAA's, and it could reduce their spending on the system by $800 million or so in the next fiscal year, and they indicated great concern about that.

Mr. McCANDLESS. I was under the impression that this system had been approved and that the funding was there to complete the program.

Mr. GLICKMAN. It is not under contract like the highway trust fund is. That is, they operate slightly differently, and so they need that yearly appropriation even though it is trust fund moneys. You don't operate like the highway system does. The highway system almost operates like it is multiyear contracted under some of the Defense Department purchases, but not here. We have not done that here.

Is that a fair statement?

Mr. ALBRECHT. Yes, Mr. Chairman, and I hope we did exhibit extreme concern over that issue.

Mr. GLICKMAN. I heard you.

Mr. ALBRECHT. Thank you.

Mr. McCANDLESS. As one who travels back and forth and has to sit at the end of the runway 45 minutes, I think nasty thoughts about all the things that go on that permit me to sit there for 45 minutes.

Mr. ALBRECHT. We are trying to hurry.

Mr. McCANDLESS. When there are no planes in the air at Dulles and nothing taking off and nothing landing, and you are sitting there 40 minutes, you wonder.

Mr. ALBRECHT. I will convey your thoughts to our air traffic people.

Mr. McCANDLESS. Thank you.

Mr. GLICKMAN. Thank you. The hearing is adjourned. We will meet again tomorrow morning at 9:30 a.m.

Mr. ALBRECHT. Thank you, Mr. Chairman.

[Whereupon, the subcommittee recessed, to reconvene at 9:30 a.m., on Thursday, March 29, 1984.]

OVERSIGHT ON THE FEDERAL AVIATION ADMINISTRATION FISCAL YEAR 1985 RESEARCH, ENGINEERING AND DEVELOPMENT BUDGET REQUEST

THURSDAY, MARCH 29, 1984

HOUSE OF REPRESENTATIVES,
COMMITTEE ON SCIENCE AND TECHNOLOGY,
SUBCOMMITTEE ON TRANSPORTATION,
AVIATION AND MATERIALS,
Washington, D.C.

The subcommittee met, pursuant to recess, at 9:30 a.m., in room 2318, Rayburn House Office Building, Hon. Dan Glickman (chairman of the subcommittee) presiding.

Present: Representatives Glickman and Boehlert.

Staff present: Anthony Taylor, staff director; Harriet J. Smith, minority technical consultant.

Mr. GLICKMAN. Good morning. The subcommittee will be in order.

Today the subcommittee will begin our third and last day of FAA oversight hearings.

In the previous 2 days of hearings, the FAA reported on the status of the National Airspace System Plan [NASP], its various components, and other research, engineering, and development programs.

Today we plan to hear from industry representatives who are also working on many of these programs on a day-to-day basis. At the heart of the NAS plan are the host computers and the advanced automation system.

So the subcommittee is very pleased that representatives from IBM have agreed to testify on those important issues today.

We are also very pleased to have representatives from Martin Marietta, the systems engineering and integration contractor, to brief us on its plans to assure that the various elements of the NAS plan are brought together and implemented in an efficient and timely manner.

I might mention, so that the record will so reflect, that there are two competitors in the host computer situation, IBM and Sperry Corp.; both were invited, but the IBM Corp. was the only one that chose to testify today, and I think the record should reflect that.

I also would mention that I started right at 9:30 today because I have a conflict that may require us to stop the hearings for maybe 20 or 30 minutes while we deal with the issue of bankruptcy that

must be dealt with as a matter of major national import, and I happen to be on that committee, so I may have to stop the hearing and then come back, and I do not intend to be rude to any of the witnesses, but I wanted you to all know that in advance.

It is a pleasure to have our first witness, Mr. Gerald Ebker, vice president, Federal Systems Division, IBM Corp.

I would say for the benefit of all the witnesses that your entire statement will appear in the record. You can either read it or summarize it, as you deem appropriate.

STATEMENT OF GERALD W. EBKER, VICE PRESIDENT, FEDERAL SYSTEMS DIVISION, IBM CORP.

Mr. EBKER. Mr. Chairman, my name is Gerald Ebker, and I am a vice president of the IBM Federal Systems Division.

My responsibilities include IBM's activities in support of the FAA's air traffic control system. I appreciate the opportunity to appear before you today to provide our views on, and the status of, the FAA's host computer development program.

As you know, the host computer development program is the first of two major, and closely related, development activities the FAA is undertaking in order to modernize the automation segment of the air traffic control system.

Since the current design competition phase of the host program is still competitive, involving two competing suppliers, my report to you will be summary in nature. Later, I will be glad to answer any questions that you might have, but due to the sensitive competitive situation, I ask that questions not relate to the specifics of the IBM bid or the competition.

The FAA, with your committee's support, has developed a comprehensive plan for modernizing the Nation's air traffic control system. In our view, the host program is one of the key activities of that plan and is the foundation of the FAA air traffic modernization program.

The present en route air traffic control centers contain the IBM 9020 computers which are based on technology which is over 20 years old. The host program will replace the central processing elements of the 9020 system with new computers without changing the current operations of the air traffic controllers.

These new computers will result in fewer system interruptions. In addition, they will provide the capability to handle increased air traffic volumes and can provide significant benefits in fuel cost savings for the airlines.

IBM has been working with the Federal Aviation Administration and its predecessor, the Civil Aviation Agency, on air traffic control since the mid-1950's. IBM was selected in 1964 to provide the en route computers for the current national airspace system. In 1965 we were selected to provide the software for that system, and in 1968 we were selected by the FAA to integrate the en route portions of the national airspace system.

In 1980 the FAA, with the support of this committee, announced its plans to modernize the national airspace system. IBM assembled a team of our people experienced in air traffic control and began exploring various approaches to system modernization.

When the FAA selected a strategy that included a host computer development program as an essential step, IBM then concentrated efforts on demonstrating the feasibility of converting the existing NAS software to operate on current technology hardware.

These efforts resulted in a series of IBM demonstrations in late 1982 to the FAA and your staff where the FAA operational software was successfully run on contemporary IBM computers. We believe that these demonstrations validated the FAA's strategy for the host program.

The FAA released a request for proposal to industry for a design competition for the host program. In September 1983 two industry teams, one led by IBM, the other by Sperry, were selected.

As we began the design competition phase of the host program, we identified three areas of risk. In response to your committee's request for our views, I would like to address these three areas, which are: Software, hardware, and transition planning.

First is a software related risk. The problem is to identify all the software changes that are necessary to allow the existing NAS software, which runs on the 9020's, to run on the new equipment. These changes must then be developed, integrated, and tested to insure that they are complete and do not impact the performance of the current air traffic control application programs.

To date we have done an extensive review of the existing software. We have identified and designed the necessary changes and have conducted a series of design reviews with the FAA. We have developed about 65 percent of the changed software, integrated 50 percent into early versions of the ultimate system, and initiated the testing process. All of these activities have occurred on the schedule established between the FAA and IBM.

At this point we are far enough into the development process to be confident that the software problem is manageable and that the software will be developed on the existing schedules.

Second is a hardware-related risk. The problem here is to connect, or interface, the new computers with the older equipment that will remain in the en route system until it is replaced by the advanced automation system in the late 1980's.

Since a full complement of the older equipment resides only at the FAA technical center and in the 20 existing en route centers, it will not be possible to completely test each interface until the new equipment is delivered to the technical center.

To minimize the risk, we have drawn on the experience of some of the engineers who originally designed the 9020 equipment. In addition, we have been able to locate some comparable equipment and install it in our development laboratory for testing. This will help us identify and resolve most of the problems of connecting the old to the new equipment before we deliver it to the FAA technical center.

Our new host system will be delivered to the FAA technical center in the next 90 days and will be connected to the FAA equipment. In our opinion, sufficient time exists in the program schedule to thoroughly test these connections.

Software development will continue through the summer. A major demonstration of the hardware and the software together

will be conducted on schedule in the early fall at the FAA technical center.

The third risk involves installation and integration of the new hardware and software systems into the existing operational field environment of the 20 en route air traffic control centers with minimal disruption.

Physical facility changes, computer operator training, installation of the new equipment and removal of the old equipment must all be considered in developing an acceptable transition plan.

This problem is being addressed by IBM engineers who installed the original 9020 system and who are intimately aware of the current operational environment. Our detailed transition plan will be completed as part of the design competition.

In summary, Mr. Chairman, we think that the host program as a first step in the modernization of the national airspace system is a reasonable approach. From our experience so far on this program, we feel the major risks have been identified and reasonably well understood, and can be contained.

Under contract, we have conducted a series of design reviews with the FAA. We have delivered, and the FAA has approved, all the major program management and master test plans. We have built, cycled, and tested early versions of the rehosted software.

In short, we have met every schedule milestone, and we are confident that the future milestones will be met. We expect to deliver a quality product to the FAA.

We appreciate the support this committee has given the FAA in developing a comprehensive plan for upgrading our Nation's air traffic control system.

We are pleased to be a part of this critical national interest project and assure you that IBM is committed to its successful implementation. Thank you.

Mr. GLICKMAN. Thank you.

One of the questions that keeps coming up is whether the central processing units or the host computers themselves will soon become obsolete after implementation of the plan, and I wonder if you might comment on that and also on if and when they do become obsolete, can they be exclusively replaced, or do we face another kind of a mish-mash method of adapting them in the process of updating them periodically?

Mr. EBKER. First, Mr. Chairman, let me say that we will be proposing the latest technology available in the systems for the FAA. Being the latest technology systems, we would not anticipate that they would become obsolete any time in the near future.

In terms of the compatibility, in terms of the ease of replacement, I think we can be confident that future systems will be processor compatible with the systems that will be installed at this time, and a major system redesign should not be necessary.

Mr. GLICKMAN. All right. You referenced the risks in your statement of software, hardware, and transition planning. I wonder if you can relate any or all of these risks to the safety of the public and/or passengers.

Mr. EBKER. Mr. Chairman, the risks I discussed were really risks in the development program; what needed to be accomplished to

deliver a new system. Since this is a development system, it would not impact the operational environment whatsoever.

Once the system is completed, it would be installed at the various centers and would be tested or qualified extensively by the FAA before the new system would ever be put on line.

So I think, through that exhaustive process of qualification, the risks of an operational nature would be greatly reduced. Second of all, the FAA system is designed with levels of redundancy so that any single element does not become a single point of failure. Here again, I think the FAA has designed a system which is very safety conscious.

Mr. GLICKMAN. Also in your statement, you reference removal of old equipment and installation of new equipment. I am just curious, will not all the old equipment stay on line as a backup until the new equipment is qualified and up and running?

Mr. EBKER. Yes, Mr. Chairman, absolutely. Our plan would be, once the facility modifications are complete, we would install the new equipment, and then there would be a period where either the new equipment or the old equipment would be capable of supporting operations, and I think that this configuration would continue for a lengthy period of time until the FAA was absolutely certain that the new system was qualified and could be certified.

At that point, the operation would switch to the new configuration, and I would expect the FAA would still keep the old equipment around for some period of time just to preclude any problems. But while both equipments are there, there is the ability to switch back and forth, and I understand that is a relatively easy process.

Mr. GLICKMAN. Will it take major changes in current operational software to be compatible with the host computers?

Mr. EBKER. You are referring to here the amount of work that we are doing in the design phase?

Mr. GLICKMAN. Yes.

Mr. EBKER. Most of the changes that we are making are in the operational control program known as the NAS monitor. An insignificant amount of change, a very small amount of code, will actually be changed in the application programs, which are the primary operational system.

Mr. GLICKMAN. One final question: What is your assessment or view of the role of the SEI contractor, Martin Marietta, as it relates to you and also as it relates to your technical authority under the contract?

Mr. EBKER. As we understand their role, they will be providing technical direction as long as it stays within the scope, the schedule, and the cost of our contracts. I believe that this would be primarily a matter of interpretation of requirements and perhaps even joint participation in trade studies and exploration of various approaches.

But as long as this technical direction is within the scope, the schedule, and the cost, the ultimate authority really continues to rest with the FAA. We have had some experience in some DOD contracts, working with firms such as Aerospace on the west coast and Mitre on the east coast, a very similar arrangement, and have been able to work very successfully in that way.

Mr. GLICKMAN. All right.

We thank you very much for testifying today. The committee is appreciative.

Mr. EBKER. Thank you, Mr. Chairman.

Mr. GLICKMAN. Our next witness is Mr. Caleb Hurtt, president of Martin Marietta Aerospace. I think you are accompanied by Mr. Frederick Hudoff, vice president and program manager, air traffic control division.

We are appreciative that you are here. Again, your entire statements will appear in the record. So, Mr. Hurtt, you can proceed. It may be during your testimony when I have to stop the hearing for a moment, so I will let you know.

Mr. HURTT. Certainly.

STATEMENT OF CALEB B. HURTT, PRESIDENT, MARTIN MARIETTA AEROSPACE, MARTIN MARIETTA CORP.

Mr. HURTT. Thank you, Mr. Chairman.

We are very pleased to have the opportunity to appear before you this morning to discuss our role as the systems engineering integration contractor for implementation of the NAS plan.

Our purpose is to provide a brief assessment of our roles and relationships which we understand you all desire. I will not read my statement but rather summarize some of what I perceive to be the salient features, and turn, really, to Mr. Hudoff, who is our program manager for implementation of the SEI work to give a more detailed programmatic overview.

It is somewhat obvious that we are pleased to have been awarded, through a rather rigorous competition, the SEI role for the FAA, and this is our case after some 3 years of quite hard work preparing for this competition.

We have been at the role since about the first of February, so I have to say that to some degree we are new in the downtown Washington area, having provided new facilities about three blocks from the FAA, specifically at 475 School Street.

We have staffed our SEI role with what we perceive to be some of the very finest people in the industry, some of the very finest people in Martin Marietta, and at this time we are a little below some 200 people on the job here in Washington.

As defined in our contract with the FAA, we have so-called mission responsibilities for implementation of the NAS plan. This means a responsibility for overall design, development, integration, and implementation of the program, and—I hasten to add—in partnership with the FAA.

To fulfill this task, we will provide—and we have no intention of ducking that—we will provide technical direction within scope of existing contracts on the selected programs, and Mr. Hudoff will discuss that in more detail.

In terms of dealing with mission responsibility, we did propose to the FAA a fee arrangement in our own case where 100 percent of our fee is to be determined subjectively by the FAA regarding our performance; that is, we are floor on this contract; the fee is zero; and every bit of it rides on the FAA's subjective view of our performance.

Mr. GLICKMAN. But, I would interject, I assume that your fee does not include your out-of-pocket costs, your salaries, and those kinds of things.

Mr. HURTT. That is correct, sir.

Mr. GLICKMAN. Those are paid under contract.

Mr. HURTT. Yes, sir.

Mr. GLICKMAN. So your fee is basically your profit in the operation.

Mr. HURTT. Absolutely correct.

We have structured our organization—that is, the organization of this new division that we have created—and I would again add, this new division, we call it the air traffic control division, which Mr. Hudoff heads, does report directly to me—we have structured it to closely mirror Al Albrecht's organization structure, and we have done that, really, to provide continuity to make for clear lines of communication, clear lines of authority, and, in our view, to provide an optimum management and control.

With regard to our role as a systems integrator, it is our view that the national airspace plan is a sound plan; it is a well structured programmatic document, one that we can easily subscribe to and work with.

I mentioned earlier we devoted a little over 3 years in preparing for this opportunity to work with the FAA, and in that 3 years, we think we have gotten to know the NAS plan and its evolution quite well.

The plan does, of course, provide the bases for the SEI contract, and it is systems engineering and integration that will pull the many pieces of the plan together and allow for a transition from the now case into the new plan from hardware/software point of view.

I would like to add that we are very pleased with your committee's support of the NAS plan and the requirement for an SEI contractor.

We do believe that while the plan, we think, is a sound programmatic document, it goes without saying that it is essential for the viability of the program that funding be supported according to the schedule for the plan, and in this context, I have to say that my experience in the aerospace business, which spans some approximately 30 years, is that stretchouts dilute program effort and almost always end up costing more in the end.

We, Martin Marietta, are dedicated—are absolutely committed—to the success of the NAS plan implementation.

[The prepared statement of Mr. Hurtt follows:]

PREPARED STATEMENT OF CALEB B. HURTT, PRESIDENT, MARTIN-MARIETTA AEROSPACE, MARTIN-MARIETTA CORP.

INTRODUCTION:

Mr. Chairman, I am Caleb B. Hurtt, President of Martin Marietta Aerospace, Martin Marietta Corporation. It is indeed a pleasure to appear before your committee to discuss our role as the System Engineering and Integration contractor for implementation of the National Airspace Systems Plan.

I would like to provide the Committee with a brief assessment of our roles and relationship with the Federal Aviation Adminstration in the performance of our tasks and then ask Frederick H. Hudoff, Vice President and Program Manager of the Martin Marietta Aerospace Air Traffic Control Division to address our role in a more programmatic sense.

The System Engineering and Integration contract for implementation of the National Airspace System Plan is the highest priority new program in Martin Marietta Aerospace. Because of the importance we placed on assuring mission success, we elected to create a new aerospace division for this program that will report directly to me, placing it organizationally at the same level as our Denver and Orlando Aerospace companies and our Baltimore Division thereby assuring complete visibility to performance and requirements. This division is headed up by our most experienced system engineering Program Manager supported by the finest team of system design engineers, program managers and software engineers in our company.

We have programmatically mirrored our organization to the FAA's Development & Logistics organization. We elected to establish an organization that correlates directly with that of the FAA in order to provide maximum responsiveness and support to NAS initiatives. The organization provides optimum management and control over statement of work tasks and is structured to emphasize continuity of leadership as the NAS program progresses with only minor modifications to reflect expanding requirements.

Mr. Chairman, it is our belief that the National Airspace System (NAS) plan delineates the improvements in facilities and equipment that are needed in the National Airspace System by the end of this century. It provides a description of the specific systems, subsystems and schedules that are in progress or are being planned to replace the current air traffic control computers. In addition it discusses the modernization of flight service stations, weather data distribution networks, the deployment of new radar surveillance and landing systems, and the upgrade of interfacility communications. As a programmatic document the NAS plan provides the basis for the Systems Engineering & Integration (SEI) contract, and it is the SEI contract that pulls the plan together. It is systems engineering that will allow the plan to transition from a hardware/software project plan to a total integrated system plan.

It is noteworthy, Mr. Chairman, that your Committee's strong support not only for the NAS plan in general, but for the requirement for a Systems Integration Contractor, is well recognized both from within government and industry.

As defined in the contract, Martin Marietta as the SEI Contractor has "mission" responsibility for the implementation of the NAS plan. To fulfill the mission, we have the responsibility to provide technical direction that is within the scope of a given program. This issue will be more fully addressed by Mr. Hudoff. We are additionally responsible to the Deputy Associate Administrator for Development and Logistics, as the NAS Program Director, for the identification of technical schedule and cost issues, as well as for assessment of potential problem areas which impact NAS plan implementation.

It is our belief that we have a mandate to provide sustained technical and managerial capability to implement the National Airspace system plan; to formulate system engineering and design for the National Airspace System plan; to accept mission responsibility for NAS Plan implementation; and to carry out our responsibility as a team member with the FAA.

The SEI contractor is responsible for the design of the NAS as it is proposed, and for the identification and preparation of corresponding functional specifications for new program elements as they are identified.

In closing, I would like to say it is our strong conviction that the NAS Plan is a sound well structured programmatic document and that it is essential to the viability of a program of the magnitude of the NAS Plan that funding profiles be supported according to schedule. It is our experience in the aerospace industry that the deferment or stretch-out of initiatives of this magnitude serve to delute programmatic objectives and are eventually more costly in the end.

The FAA in close concert with the congress has structured a sound plan. We at Martin Marietta welcome the opportunity to become a major industrial partner of the FAA and we readily accept mission accountability for implementation of the National Airspace System Plan.

Mr. Chairman and members of the committee, thank you for the opportunity of being with you this morning. I would now like to introduce Mr. Frederick H. Hudoff, Vice President and Program Manager of our Air Traffic Control Division.

BIOGRAPHY
Caleb B. Hurtt

Caleb B. Hurtt is President of Martin Marietta Aerospace and is a Senior Vice President of Martin Marietta Corporation. He was elected a corporate Vice President on June 30, 1980, became President of the Aerospace company on April 22, 1982, and became Senior Vice President of the Corporation on September 22, 1983.

Mr. Hurtt joined the Corporation in 1956 at Denver Aerospace where he served as President from June, 1980, to April, 1982. He had been involved in a progressively responsible series of both technical and managerial assignments at Denver Aerospace, including the position of vice president for program development; vice president for manned space systems, in which he was the principal project executive for Martin Marietta's participation in the highly successful NASA Skylab project; vice president and general manager; and president.

Some of Mr. Hurtt's earlier assignments were manager of systems engineering, assistant to the general manager for the Titan III program, chairman of the flight readiness team, and head of the technical support team for the Eastern Test Range at Cape Canaveral, Florida, during early Titan III flights.

Mr. Hurtt was born at Ridley Park, Pennsylvania, on August 15, 1931. He was graduated from Stevens Institute of Technology and, while a student, taught machine design at the Institute's night school. In 1964, Mr. Hurtt was designated a Public Affairs Fellow by the Brookings Institution at Washington, D. C. He had served earlier, immediately after college, as an Air Force officer of the Research and Development Command at Holloman Air Force Base, New Mexico.

Mr. Hurtt holds the NASA Public Service Award for his management contributions to the agency's Skylab program. He is a Fellow of the American Astronautical Society and a member of numerous defense and industry associations.

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Mr. HURTT. Mr. Chairman, I would like now to introduce Mr. Hudoff, who will go into more detail about our role. I would quickly add that Mr. Hudoff is a vice president of Martin Marietta Aerospace. Most recently he has been in charge of operating a major integration role for us and for the Air Force, namely the bringing together of the shuttle launch site at Vandenberg Air Force Base in California.

His experience is principally with electronics and with software development programs. We look at him as really one of our most senior integration program managers.

Mr. GLICKMAN. Before we begin with Mr. Hudoff, this may be a good time for me to break and check on my other committee status, so let's just recess the hearing for maybe 15 minutes.

Mr. HURTT. Very fine, sir.

[Short recess taken.]

Mr. GLICKMAN. The hearing will resume.

I do not want the impression to be that going back and forth in any way diminishes this subcommittee's interest in this program. I am sure you all realize that.

Mr. HURTT. We fully realize and understand that, Mr. Chairman.

Mr. GLICKMAN. Go ahead.

STATEMENT OF FREDERICK H. HUDOFF, VICE PRESIDENT AND PROGRAM MANAGER, AIR TRAFFIC CONTROL DIVISION, MARTIN MARIETTA AEROSPACE

Mr. HUDOFF. Mr. Chairman, I would like to use a set of vugraphs to address the issues facing the SEI contractor and to try to deal with some of the subjects that I think you may be interested in.

If I may, I will try to deal with the focus of our effort within the structure of the FAA and how we plan to do it.

[Slide shown.]

As you can see, as Caleb stated, we have organized a new division here in Washington close to the FAA to deal with the NAS plan. Mr. Hurtt's aerospace company is a separate company within the Martin Marietta Corp. structure. He has other responsibilities. Our division, being newly formed, will draw on the resources of our Denver aerospace company, primarily for the management team that is here in place, and from our Martin Marietta Data Systems Co., who will provide us with our data systems skills and with our computer laboratory that we will put in place in our new facility in order to support the SEI development program.

[Slide shown.]

This next chart looks at the organization structure that we put in place. On the right is the subcontract team that we have in place with us, colocated with us. We felt that it was necessary that our entire team structure be in one building to integrate the systems integration portion of our job.

On the left there are three tiers. One is the management structure that we have in place to manage the SEI contract. That is the care and feeding of our people; it is the internal business management structure that manages a very large contract; and the resources necessary to support the evolution of our staff.

The technical management team and the project management team, to some degree, mirror the organization of Mr. Al Albrecht of the FAA and in turn provide me a direct interface with Frank Frisbie, the program manager of the FAA, and complement one on one with the implementing structure that the FAA has in place.

[Slide shown.]

I would like to address at a high level what our view of the job is. First, we are a major contractor—having the process—and have developed the methodologies to implement major programs. As such, we bring with us, in terms of our management team—there were 43 people selected in Denver that have essentially grown up in the Denver aerospace environment of systems engineering, and to that degree we have a startup team that are self-starters in themselves.

Mr. GLICKMAN. Mr. Hudoff, you are going to have to hold up for a minute; I have to run. We will adjourn briefly.

[Short recess taken.]

Mr. BOEHLERT [acting chairman]. Let's proceed.

I really apologize for this crazy, mixed up schedule, but it enables a freshman Republican to sit in this chair, so I don't apologize too vociferously. [Laughter.]

But the Republicans are now in the midst of a conference, and I have just left Secretary Shultz, and he is talking about a little matter called Central America. But it got to the question period, so I thought I could leave.

Proceed.

Mr. HUDOFF. Mr. Chairman, if I may, I will continue with a series of foils before you came in that try to describe our role and our implementation approach.

The first bullet addresses bringing to this job a skill level of systems engineers and integrators that grew up in our aerospace environment, our aerospace company, and apply that talent and the process that they have learned over the years to this job.

As such, we have our entire management team in place and, in addition, we have our subcontract team in place, and as I mentioned, they are all colocated with us.

The second bullet addresses the methodology for doing the job. The FAA has the master plan; it is called the NAS plan. It is a good plan. In our experience in the 3 years that we studied the problem of the NAS implementation, we concluded that the kind of methodology that we have developed over the years was applicable directly to this plan, and that is what we intend to put in place to support its implementation.

Mission responsibility is a part of the structure that the FAA created for the SEI contractor, and as such, it is a partnership with the FAA to get the job done. It is a voting partnership; it is an implementation partnership; it shares the responsibility in a sense, in a technical sense, in order to make all of the decisions within the methodology called systems engineering and integration, to see that the NAS plan is carried out.

As Mr. Hurtt mentioned before, our dedication to our role of mission responsibility was in part our acceptance of a fee structure, a profit structure, that was based on the FAA's subjective judgment on how well we carried that role out.

That role is not to be an adversary role. It is one of teamwork and cooperation with the FAA. It is clear to us that the FAA are the system managers of this job. We work for them. However, they have given us the tools in this contract in order to support the implementation of the systems engineering process.

[Slide shown.]

Next I would like to try to deal with the bullets on the right, primarily. You heard earlier in the week the FAA talk about the status of the NAS plan. We are into the program some 6 weeks. However, we accept the challenge that our role started on day one. It got us essentially into every operating organization within the FAA. They have supported us in getting on board. In fact, it has been done in a professional way; that their sponsorship of their systems engineering contractor within their organization was really the first step in the process.

We have a sharp buildup to get all of the contract activity under way. We will have approximately 1,000 people in our facility supporting all aspects of the NAS plan implementation.

Our role is a two-pronged role, if you will. One is to support the program managers that are in place within the FAA. This provides support in the form of technical support, management support, programmatic support. It helps the program manager get his individual job done.

There is another role, a broader role, which is bringing to the current NAS plan the systems engineering process, and as such we assume a role, a design role and an integration role, that applies the process to see the individual systems brought on line and commissioned in a support capacity to the FAA.

We provide, as a part of the tool that the FAA has given us, technical direction. As Mr. Ebker said, the role of technical direction is a confidence role built up between the program manager of the FAA and our team that allows, within the scope of the contract, to interpret the contract in light of the entire goal of the NAS plan.

No. 1, it has got to be within the scope of the contract. It cannot be an adversary environment where we are giving technical direction without the knowledge of the FAA. However, it allows our resources to be applied in a technical way to interpret things that the program manager, having confidence in our people, would allow us to go forward and do.

Systems integration planning support, again the NAS plan is a major program. It is an extremely large and volatile program. The program management tools that we brought to the party are the same tools that we have used over the years to implement our own programs for the DOD environment.

[Slide shown.]

This chart tries to reflect the transition that the FAA had the foresight to put in place as we proceed into the contract. It is a stairstep process that allows us to tackle some near-term problems in order to transition into the framework of the FAA and into the NAS plan. It provides us the transition from monitoring roles, which are those roles necessary to bring us on board, to technical support roles that provide us an active participation with the program managers, and then finally to technical direction roles that ongoing programs, as they go into a design phase, into a test phase,

supports program reviews, design reviews, the selloff process of hardware and software.

Now, with regard to an early role, the independent verification and validation process is one role that is applied to enhance the software process. Our teammate, Logicon, was brought on board with all of the tools necessary to support that role.

The chart shows approximately a 3-year transition to full mission accountability, a transition plan that allows us to assume the technical direction roles in the 2- to 3-year time period.

The management responsibility allows us to immediately embark on evaluating the current design, auditing the current design, and then providing the necessary skills to take that current design through the systems engineering process, through the test phase of the program.

[Slide shown.]

The second part of the transition phase is active program management with the cooperation of the FAA program managers and in a full mission accountability role where we are in joint partnership with the decision process with the FAA. This means that subsystems are under way; contracts have been let by the FAA for all of the system and subsystem contracts; and this phase of the program is a very active program of design review, design analysis, compatability analysis, the interfacing of all of the systems, bringing on-line all of the paperwork necessary to assure that the systems are all tied together.

[Slide shown.]

This is another view of the process. At this point, the FAA has the level I design complete. They have embarked on the level II design. Our initial role in the transition was to audit the level I design to validate, if you will, the decision process that got the FAA to this design.

Our initial view of that process is one of a very well structured design. The right decision process has been implemented to get it to the point it is today.

The level II topology is our initial thrust into formulating the system and subsystem specifications of the systems that are coming in the 1984, 1985, 1986 time period, and starts to put the discipline into the program, where the magnitude of it requires that discipline.

The level III and IV design phases are tracking the system into the field through the test phases of the program, all at this point implemented through the systems engineering process.

On your left you see the programs that the FAA has retained total responsibility for in terms of the contracting methodology. In a sense, they are the program managers of each one of those programs directly; we are their technical support arm.

[Slide shown.]

If you look at the sensitivity of how the distribution of our manpower was structured, you can see the majority of it was applying the skills to the systems engineering portion of the job. Somewhat less but equally important is to provide the FAA program managers with the technical support arm to carry out their function.

Contract management; we have all of the skills necessary to run a major program of this magnitude.

[Slide shown.]

We identified, along with the FAA, another view of the transition. What were the early jobs that we should get involved in and, in a sense, get our feet wet? We are involved in two major audits. We are engaged now with them on reviewing the level I design. Our IV and V contractor is in place. Our computer center is up. Our final hardware delivery is this Sunday. We should be in full operation with our system to support all of the tools for the systems engineering job within 6 weeks.

Our A&E contractor, Parsons, is on board, and we have some initial engineering that Parsons is engaged in in support of the host program and in support of other ongoing programs.

Our project management team, we have engaged with the APM organization and are providing people to engage in those systems that are in process. Technical resources have been applied in those areas, and the working relationship now, the communication links have been established, and we are well under way.

Program support tools, we are bringing those on line. As I mentioned, our computer center is fundamental to getting these validated. We have to assure that our data that we inject into our system is the same data that the FAA has been using so that we calibrate our system to the FAA metrics.

[Slide shown.]

Now, for a little bit of current status, we have mobilized our headquarters. I would invite you all over; however, we are struggling with a few of the necessities of getting our team in place. However, let me say that everything seems to be working well.

We have currently under way an activity to deal with the liaison agreements with all of the FAA system and subsystem contractors. In a sense, it puts us into a role of dealing with their proprietary data. It makes us an agent of the FAA in a formal sense. We are charged by the FAA with negotiating liaison agreements with each of the FAA contractors. In our previous history, we have done that. We see that that can be an activity that should proceed based on our experience, and we don't foresee a problem with us dealing with data that is proprietary in nature, confidential in nature.

Under way is our contract management plan and our program plan. These plans communicate to the FAA the details of our implementation approach. These were contract deliverables that provided the first view of the transition from the proposal phase of a program to the initial doing phase of a program.

The NAS plan audit is under way. We have staffed that. The FAA has given us access to all of the data that they have that is necessary for us to do a complete audit of the NAS plan. That was a transition task that they assigned to us. We should complete that audit in August. That audit report would be presented to the FAA. It looks not only at the programmatics of the current program; it looks also at the design of the current program.

Level II in design approach is under way. We have staffed that. We have had methodology briefings with the FAA to tell them our approach. We have met with the Mitre Corp. people that have been actively engaged. We have met with the FAA Tech Center people who are also actively engaged in the process.

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Our staffing program is one where we have about 180 people on board, including our subcontractors. They are all actively engaged in tasks that we felt, and the FAA felt, were necessary to apply initially in this phase of the program.

[Slide shown.]

The last is one of, we are committed to the job; we studied the job; we know potentially where some of the risks are to the program. The FAA has identified in their series of briefings early on the status of the program.

As we continue with our effort, we are committed to complete the NAS plan under the scope of the contract. We have the capability in the form of our technical people; we have the background to do the job; and they have given us, within the scope of the contract, all the resources necessary to bring on board tools, a data center, that are necessary for us to operate.

We find a sense of cooperation with our counterparts at the FAA. It is one of friendliness, sponsorship. I felt as a program manager that one of the fundamentals that was necessary for a systems engineer to step on board a program is to get their sponsorship, and I might report to you that they have supported us at all levels of their management team, putting us in place in the right areas, giving us all of the data that we need.

That summarizes, Mr. Chairman, my portion of the briefing.

[The prepared statement of Mr. Hudoff follows:]

PREPARED STATEMENT OF FREDERICK H. HUDOFF, VICE PRESIDENT AND PROGRAM MANAGER, AIR TRAFFIC CONTROL DIVISION, MARTIN MARIETTA AEROSPACE

Mr. Chairman, my remarks this morning will concern the following areas:

- o Program Execution
- o Project Management
- o Internal Management
- o Transition
- o Status

PROGRAM EXECUTION:

Program Plan:

Just as the NAS plan describes what has to be done to modernize the NAS, our contract calls for the development of a SEI Program Plan which will describe SEI tasks and responsibilities. Specifically, this plan which will be submitted in draft to the FAA for review and comment on April 2nd and in final format on June 1st 1984, will define who will be responsible, and how, when and where tasks will be accomplished. The Program Plan will be structured to clearly delineate our contractural roles and responsibilities to the FAA and define interfaces between the Martin Marietta team and the system and sub-system contractors. Task prerequisites, task interrelationships, timing and responsibilities will be defined in this document. The program plan, will, therefore, serve as our integration management tool for the NAS modernization program.

NAS Plan Audit:

The overriding goal of the NAS Plan is to provide for the safe and efficient use of the nation's airspace while minimizing user constraint. The plan is based on system requirements as well as goals and historical data. As this is an on-going dynamic process the plan is updated annually. In support of this requirement, one of the initial tasks that we will perform as the SEI contractor will be an audit of the existing NAS plan which will be completed by August 1, 1984.

The purpose of the audit will be to validate the plan in the areas of goals, objectives, requirements, assumptions, funding commitments, schedules, costs, methods and safety. Additionally, we will assess and verify the plan's technical validity and determine the capability of the projects that implement the plan to meet overall NAS objectives. Included in the audit will be an evaluation of projected cost savings as well as the development of automated tracking files. The audit will serve to benefit both the FAA and the SEI contractor in that, first, the NAS plan will become a more solid plan through an additional independent validation and, second, it will provide an in-depth baseline from which to structure our ability to accept responsibility for mission accountability. I wish to emphasize, however, that based upon three years of indepth analysis, that we would not have undertaken a task of

this magnitude unless we firmly believed that the NAS Plan was conceptually and programmatically sound and that it should continue to be developed according to its prescribed schedule.

NAS Plan Updates:

As previously stated, and in response to Congressional direction, the NAS plan is updated yearly. Commencing with the FY85 plan, the SEI contractor assumes responsibility for this update which the FAA, in coordination with OST, will submit to the Congress. Accordingly, based upon the aforementioned audit, we will draw heavily on program management, system design and project management personnel who are familiar with the latest project and program data and use of specific program control tools.

Program Control Tools:

One of our initial responsibilities is to install and initialize program control tools on a dedicated computer. Program Management and Program Control Tools have been selected on the basis of their ability to assist the FAA in its management of the NAS modernization program as well as acquisition support, cost, schedule and risk analysis and configuration management. Systems and models have been selected which are specifically tailored for each discipline

and then interfaced into an adaptable general purpose data base management system which will interrelate mutual data and consolidate their output through a common graphics system. Summary information from these tools will be available to authorized FAA users.

Design:

The FAA operates one of the most complex, highly sophisticated command and control systems in the world. This system must operate safely and continuously throughout the total moderinzation process identified in the NAS plan. We view the program execution functions of system engineering as the key technical engineering activities necessary to assure a safe, successful transition. These functions are reflected in four general areas of design.

Level I Design:

As with the NAS Plan audit, another of our near term responsibilities is to conduct an audit of the existing Level I design which has been developed by the FAA and establishes the NAS architecture. In order to accomplish this task, we will perform a functional flow analysis of the Level I design, build a system description diagram and identify any key technical issues that may be unresolved. This audit, which will be completed by 15 August, will serve as the baseline for the Level II design.

Level II Design:

During the level two design we will strike a compromise between the ideal top-down, structured design and the realities of upgrading the existing system. We will in addition apply structured analyses technology and modern data base methods to produce requirements traceability in a top-down fashion and aggregate project specifications requirements to assure design consistency and integrity.

Level III Design:

Level III design will mark the transition from a system design phase to a system implementation phase that uses products of the system design and individual project development. In Level III design, projects will be grouped into logical, functional implementation packages for integration and testing at the FAA Technical Center and for field deployment.

Level IV Design:

Level IV designs will further the packaging and planning process to provide site-specific implementation packages for facility constructions, site installation, test and support.

We recognize that in moving from Level I and II designs to Level III and IV designs, that the design process shifts from design requirements of projects to design of implementation packages. Phased integration and installation of projects in the NAS modernization program is an effort of considerable complexity involving a large number of permanent and transitionary interfaces. It is the tasks of integration & test & installation and test to assure that this transition process is implmented smoothly and safely. Throughout this process, the ADL organization of the FAA will be the focal point for development and implementation of policy and management decision while we will provide the technical capabilities necessary to assure that the overall integration process is a total team effort.

PROJECT MANAGEMENT:

As the Program Management Plan's execution is impacted by system level design, the degree of program management support to any given program is determined by where that program is in the design procurement cycle.

The cycle will, therefore, determine the degree of technical assistance, procurement package preparation, proposal preparation and evaluation, system and sub-system design status review and performance of the SEI contractor in the role of technical director to select system and sub-system contractors.

In addition to the above stated roles and responsibilities, the SEI contractor in conjunction with congnizant program managers will plan, schedule and monitor activities associated with field installation as well as the commissioning and certification of new systems and sub-systems.

While the government has retained final responsibility and authority for implementation of the NAS plan, the SEI contractor is responsible for the overall design, development, integration and implementation of the program. As the NAS programs are in different stages of development, from design to production, the SEI contractors involvement in the decision process with vary. Accordingly, the FAA has determined that projects should be grouped into four categories of SEI programmatic influence. They are:

Group I: Projects which are still in the formative design stage and for which the SEI contractor will play a major role in determining the final design.

Group II: Projects for which designs have been specified and upon which the SEI contractor can have only limited influence.

Group III: Projects where the sub-systems are in production and projects that are of an interim nature over which the SEI contractor will have little or no influence on design.

Group IV: Projects in existence whose systems and sub-systems are not presently scheduled for replacement or projects in various phases of implementation over which the SEI contractor has no influence on the design process.

We will provide configuration control to Groups I, II, and III. Additionally, in Group I we will be heavily involved in project definition, project monitoring, technical support, technical direction. In Group II, we will provide technical support and monitoring and in Group III, we will monitor project performance.

Technical Direction:

It is the technical direction role of the SEI contractor that has drawn wide interest, both from within government and from industry. I would, therefore, like to touch on this issue and more clearly define our technical direction role.

In order to satisfy the requirement that Martin Marietta as the SEI contractor fulfill our obligation of "mission responsibility" for the implementation of the NAS plan we are permitted to give technical direction to program element contractors whose programs are contained in the Group I category. It is emphasized that this direction can only be given within contract scope. Any recommended changes in

requirements or scope of work for program element contracts will be provided to the specific program manager for presentation to a FAA Configuration Control Board, chaired by the NAS Program Director, for review and adjudication. It is further emphasized that the SEI technical direction responsibility will occur as the result of a phase-in process during which a given program manager and that program managers SEI interface will be working as a team with the system or subsystem contractors towards the common objective of integrating the program into the total NAS. It is this specific objective that distinguishes the systems role of the SEI contractor from the more conventionally recognized role of the "support" contractor throughout the entire programmatic process. Our personnel will support the specific objectives of each program manager, while simultaneously, under our mission accountability role, continually assessing each programmatic issue in light of its impact on the total NAS.

INTERNAL MANAGEMENT:

An internal management organization has been established to plan, organize and conduct the activities of the contract.

Organization:

Our management investments have been significant, both in the selection of personnel and investment in resources. To complement this commitment we selected a strong, experienced group of subcontractors with demonstrated records of performance on FAA contracts. They are:

ARINC Research: For support in the diverse area of communications.

LOGICON: For software independent verification and validation.

Ralph M. Parsons Co: For architecture and engineering support in site design and construction surveillance.

Systems Control Technology: For navigation and landing aids support.

Stanford Telecommunications, Inc: For ATC Automation.

Engineering & Economic Research: To assist us in relating the National Airspace Review to the NAS Plan as well as providing support to the NAS Plan audit.

Our subcontractors are presently under contract and their personnel staffing is proceeding according to schedule.

Personnel:

In conjunction with the FAA, a time-phased staffing plan has been developed to optimize allocation of skills to tasks.

During the initial phase of the program the majority of personnel will come from existing Martin Marietta resources, as well as the resources of our subcontractors with a minimum of 10% of the total program allocation to small disadvantaged firms. Staffing in succeeding years will be a combination of personnel transfers and new-hire acquisition activity. Currently we have a total of 175 personnel on board and will reach a total of 320 at years' end. Our peak manning level will approximate 1,050 by the 1987-88 timeframe.

TRANSITION:

Our phase-in to the SEI contract will effectively occur in two general steps. In the initial phase-in, we will analyze basic requirements, system design and NAS planning data that was initially developed by the FAA prior to contract award. We will then prepare the total system design and master plan for NAS plan implementation. In addition, we will provide technical personnel in numbers and disciplines to support the program managers. During the second phase, which will commence in the mid-1986 to early 1987 timeframe, Martin Marietta will assume mission accountability which will include the responsibility for technical direction on select programs.

STATUS:

The SEI contract was awarded, signed and became effective on January 31, 1984. The contract delineates numerous deliverable plans and reports time phased to the contract date. A preliminary Contract Management Plan was delivered on schedule March 1st. The final version of this document (which will be updated quarterly) is due April 2, 1984.

As there are 60 statement of work paragraphs that stipulate requirements for deliverable plans and reports, a detailed description of these items was considered too voluminous for the purposes of this testimony. This information is available for the committee's review should it be desired.

In summary, however, I would like to review some of the near term initiatives:

With regard to transition, our Air Traffic Control/System Engineering and Integration headquarters is mobilized. Transition briefings to cognizant FAA service branches are complete and liaison agreements with the FAA's system and subsystem contractors have been initiated.

Preliminary SEI planning actions are complete including the Contract Management and Program Plans.

We are in the process of conducting audits of both the NAS plan and the Level I design which will be completed in August 1984.

Level II and III design actions have been inititiated and staffing of NAS plan current projects are in progress.

Mr. Chairman and members of the Committee, thank you for the opportunity of addressing you this morning.

FREDERICK H. HUDOFF
Vice President and SEI
Program Manager

EDUCATION
BSEE, University of Alabama, 1959
MSEE, Prerequisites Completed, University of Colorado, 1965

HONORS
NASA Public Service Medal, 1977
Martin Marietta Corporation
Engineer of the Year, 1973

EXPERIENCE

Total	29 years
Martin Marietta	24 years
Program Management	13 years
Development	16 years
PROGRAM COMMITMENT	100

ASSIGNMENT LOCATION
From - Vandenberg AFB, CA
To - Washington, D.C.

SEI PROGRAM MANAGER REQUIREMENTS—Current applicable experience directing and managing large programs with complex electronics systems and subsystem development and integration content. Demonstrated ability to resolve complex programmatic issues involving associate contractors and subcontractors. Capability and sensitivity to interact with a new customer (FAA).

SEI PROGRAM RESPONSIBILITY—Mr. Hudoff has total responsibility for performance of the NAS SEI contract and will be accountable to corporate management for meeting program objectives. He has the authority to manage and direct all phases of the program; represent and commit the corporation in matters dealing with the fulfillment of our contractual obligations; direct and control assigned personnel and physical resources; execute contractual documents; and is senior authority with the FAA on all matters pertaining to the NAS SEI contract.

EXPERIENCE APPLICABLE TO NAS MODERNIZATION PROGRAM

VICE PRESIDENT AND PROGRAM DIRECTOR, SPACE SHUTTLE GROUND SUPPORT SYSTEMS DEVELOPMENT AND INTEGRATION—Mr. Hudoff has been Vice President and Program Director of the Space Shuttle GSSI contract and the Space Shuttle activation and checkout contract since late 1980. These contracts, totalling approximately $900M, provide for the development and activation of facilities and ground systems for launch and landing of the Shuttle vehicle from Vandenberg AFB, CA. Mr. Hudoff has total cost, schedule, and technical performance responsibility for this major Department of Defense program. The program is currently on schedule, within contract costs and Air Force funding limitations, and is technically sound. All technical requirements are being met for a system involving complex electronic systems, software, and mechanical subsystems.

PROGRAM DIRECTOR, NAVSTAR GLOBAL POSITIONING SYSTEM SATELLITE—He directed the Stage I System Design and Integration contract for the ground control segment of the NAVSTAR GPS, which involved computer system and software development with multiple government agency interfaces.

PROGRAM DIRECTOR, CLASSIFIED REAL-TIME INTELLIGENCE PROCESSING SYSTEM—Mr. Hudoff was program director of a large, classifed DOD contract for a real-time intelligence processing system design and development involving command and control, multicomputer systems, and man-machine technology, and for system deployment at several locations. Because of the nature of this effort, significant customer coordination was involved. The system was delivered on schedule, within budget, and is now operational.

TECHNICAL DIRECTOR, TACTICAL FLAG COMMAND CENTER (TFCC)—As technical director for the U.S. Navy TFCC program, he was responsible for developing the system architecture, partitioning the system, and preparing the system and subsystem specifications that provided a major data processing and analysis capability for tactical command and control.

MANAGER, VIKING LANDER SYSTEMS DESIGN—Mr. Hudoff served as manager of the Viking Lander systems design responsible for Lander requirements, integration of the Viking Orbiter and Lander, and compatibility analysis of the Lander hardware and software subsystems during the production phase.

PROGRAM MANAGER, VIKING PHOTOSENSOR ARRAY SUBSYSTEM—He was program manager of a crash effort to design, qualify, and produce a photosensor array subsystem after the subcontractor's efforts had failed. This subsystem was vital to the success of the Viking Mars mission. All items of this complex electronic unit were completed on schedule and within allocated budget.

DATA MANAGEMENT CHIEF, VIKING LANDER—As chief of data management, Mr. Hudoff managed the design and development of the computerized ground systems required for ground testing of the Viking Lander vehicle.

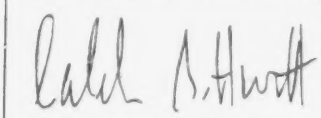
EARLY DESIGN/DEVELOPMENT EXPERIENCE—Mr. Hudoff's career began at Martin Marietta in 1959 as an instrumentation development engineer for static testing of the early Titan rocket boosters. He participated in electronics subsystems design of both flight and ground systems during the Titan and Skylab programs, and as program manager of several major subcontracts.

OTHER RELEVANT DATA—In 1977, NASA awarded Mr. Hudoff the Public Service Medal for his contribution to the success of the Viking Lander mission. He was honored as Martin Marietta Corporation's Engineer of the Year in 1973. Mr. Hudoff has received other technical achievement awards from Martin Marietta for his significant contributions to program success.

REFERENCES—Brig. Gen. D. W. Henderson, Commander, USAF Space & Missile Test Organization (805) 866-6071; Col. W. S. Yager, Commander, USAF Shuttle Activation Task Force, (805) 866-3862.

ENDORSEMENT OF THE PRESIDENT, MARTIN MARIETTA AEROSPACE

I selected Fred Hudoff for this job because of his success in program management leadership on complex jobs with multiple interfaces and high electronics and software content. The GSSI program encountered some schedule and cost difficulties before Fred's assignment. He stabilized and then improved performance, as evidenced by the current financial status of the program. He also performed a rescue job on the development of a large, classified real-time intelligence processing system which is now operational. Earlier he was program manager of the Viking Photosensor Array Subsystem, critical to obtaining images on the surface of Mars, after the subcontractor's effort had failed. Among his strong traits is the ability to work well with government customers, associate contractors, and subcontractors.



Caleb B. Hurtt
President,
Martin Marietta Aerospace

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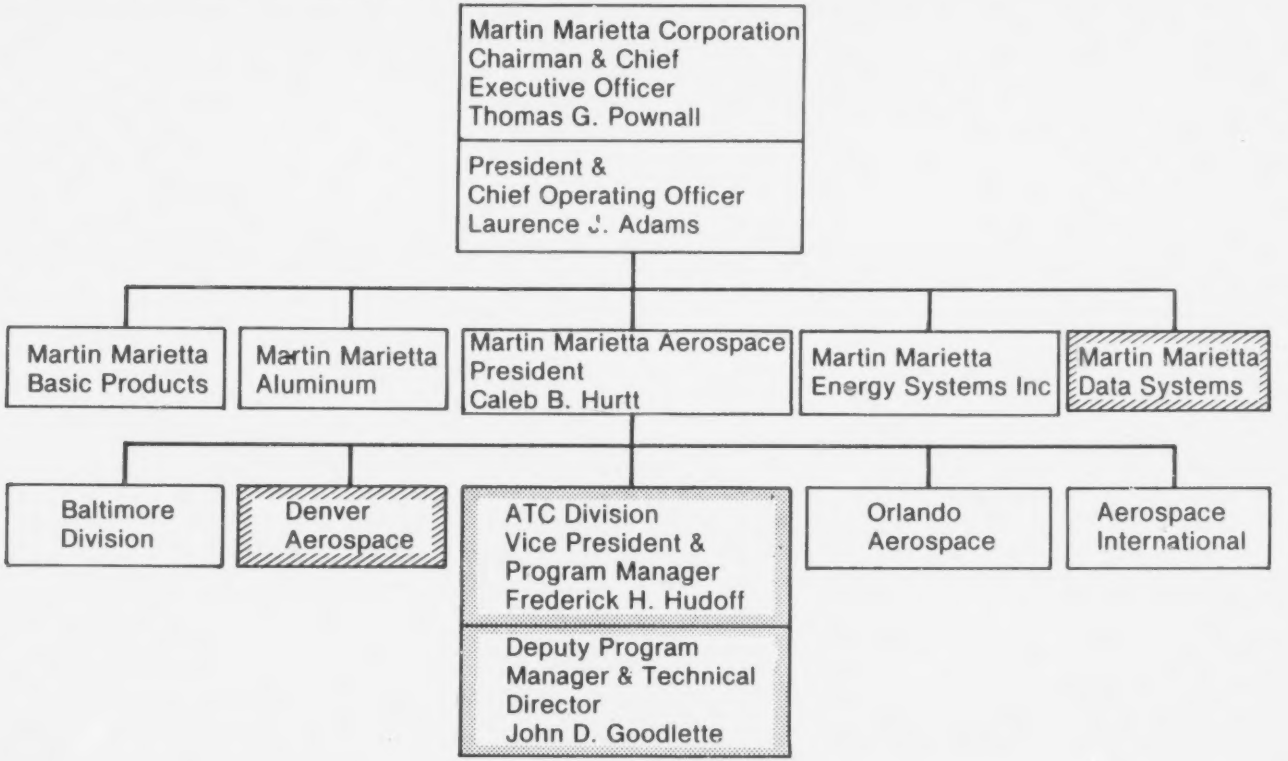
Martin Marietta Aerospace
Air Traffic Control Division

F. H. Hudoff
Vice President and Program Manager

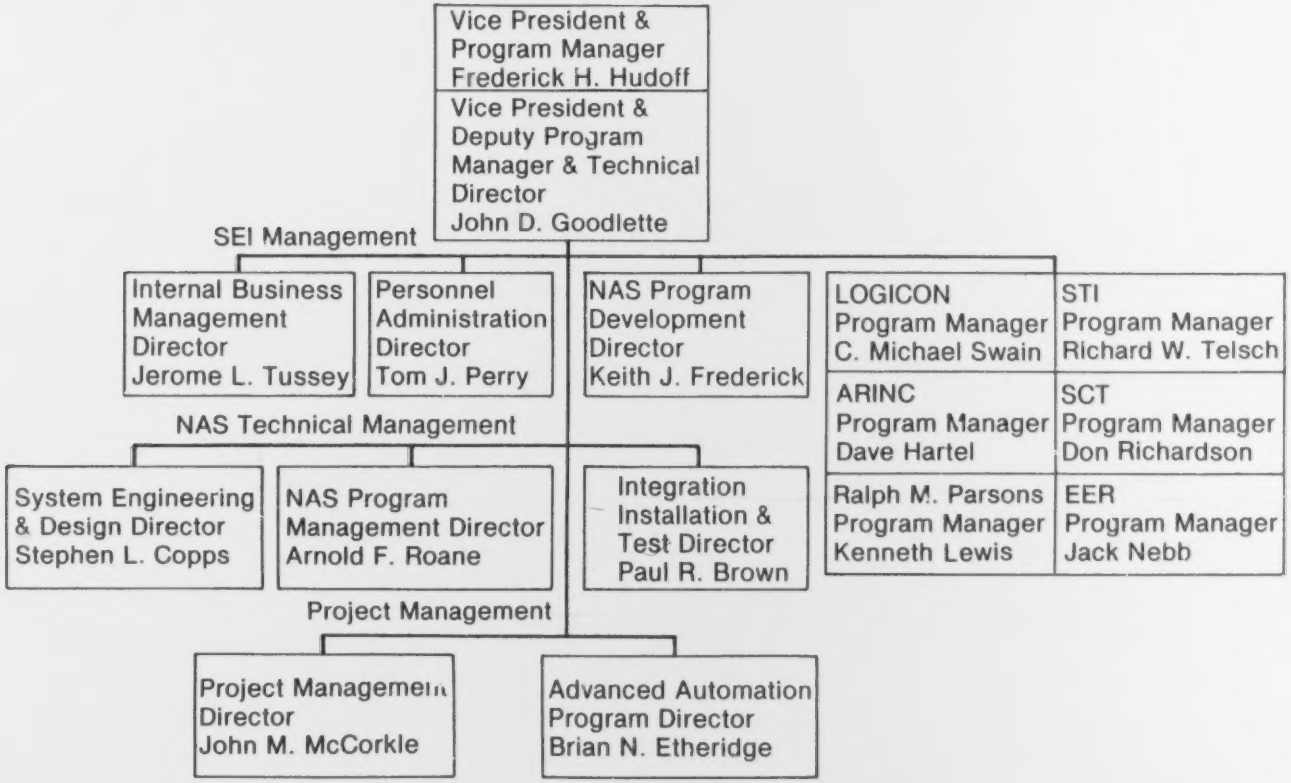
MARTIN MARIETTA

Martin Marietta, Air Traffic Control Division

Martin Marietta Corporate and SEI Organizations



Martin Marietta, Air Traffic Control Division


Vice President & Program Manager Frederick H. Hudoff
Vice President & Deputy Program Manager & Technical Director John D. Goodlette
SEI Management
Internal Business Management Director Jerome L. Tussey
Personnel Administration Director Tom J. Perry
NAS Program Development Director Keith J. Frederick
LOGICON Program Manager C. Michael Swain
STI Program Manager Richard W. Telsch
ARINC Program Manager Dave Hartel
SCT Program Manager Don Richardson
Ralph M. Parsons Program Manager Kenneth Lewis
EER Program Manager Jack Nebb
NAS Technical Management
System Engineering & Design Director Stephen L. Copps
NAS Program Management Director Arnold F. Roane
Integration Installation & Test Director Paul R. Brown
Project Management
Project Management Director John M. McCorkle
Advanced Automation Program Director Brian N. Etheridge

Martin Marietta, Air Traffic Control Division

"Mandate"

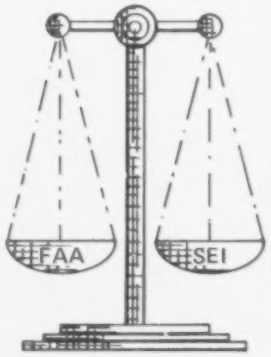
- Provide Sustained Technical and Managerial Capability To Implement the National Airspace System Plan
- Formulate System Engineering and Design for the National Airspace System Plan
- Assume Mission Responsibility for NAS Plan Implementation
- Carry Out Responsibility as a Team Member with the FAA

MARTIN MARIETTA

Martin Marietta, Air Traffic Control Division

A Team Approach

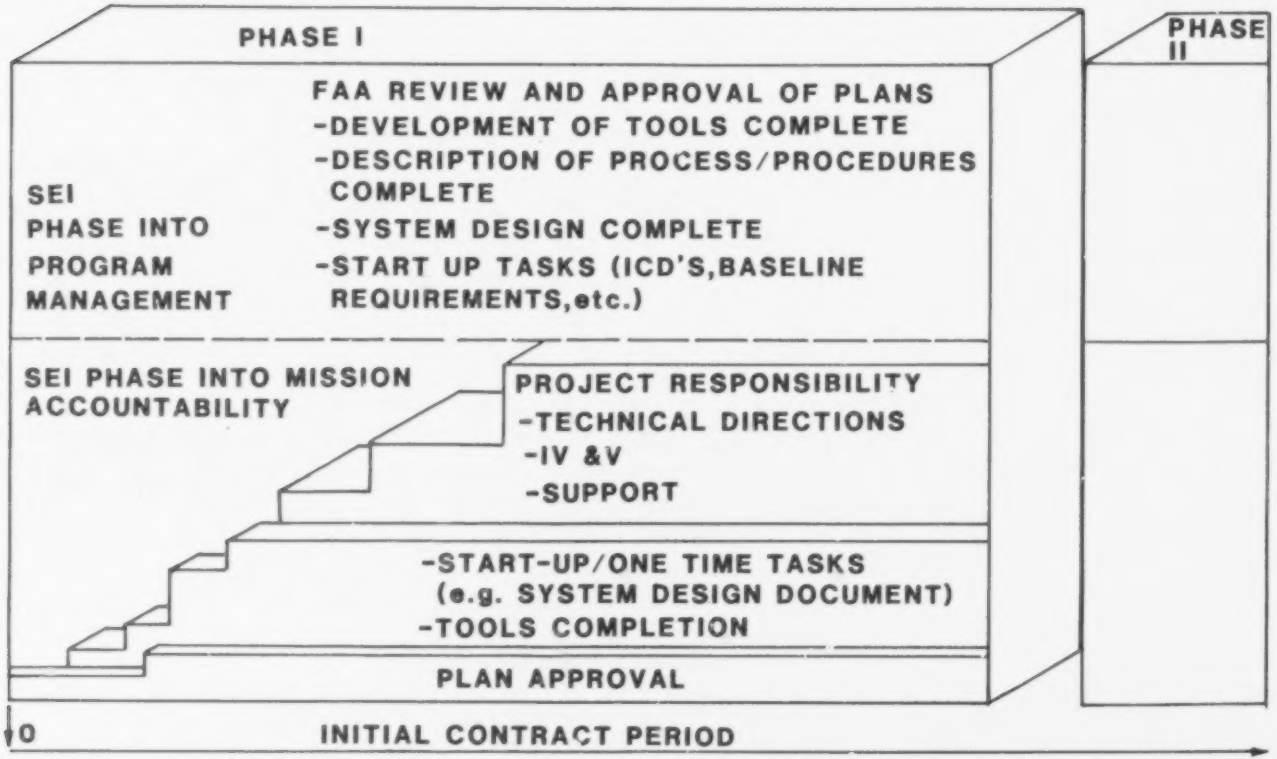
- "Contract" with Congress
- 1500 Technical/Management People
- F&E Program Planner
- Program Management
- Contracting
- System Implementation/Acceptance



- Contract with FAA
- 1000 Technical/Management People
- Planning Support
- Management Support
- Overall System Design
- Technical Support/Technical Direction
- System Integration Planning/Support

MARTIN MARIETTA

Martin Marietta, Air Traffic Control Division



Mr. GLICKMAN [resuming as chairman]. I would like to ask this basic question: How will you share in the risks of implementing the NAS plan? What is Martin Marietta's risk in all this?

Mr. HUDOFF. Well, I would like to address that first in a financial way. If we don't do our job, we get no fee, no profit. So as a program manager, I have an inherent goal, a challenge within the corporation, to make a profit on this job.

Mr. GLICKMAN. All right. Now let me ask you this question: When you say you make no profit, are there any indirect costs built into your basic charges that accounting wizards, if they pulled the numbers apart, might say, Well, you say there is no profit, but really there is, because you can charge for overhead and you charge for—I mean, over and above the actual salaries of your people?

Mr. HUDOFF. Let me try to address that, and then let Mr. Hurtt address it from his vantage point.

One of the things that we have learned over the years is that in a structure, overhead always presents a resource that can be challenged, and in our case, all of the labor on this program, every hour of labor, is charged directly to the contract. There is no overhead pool, if you will, of management off in some back room that is helping.

We chose that because we felt that the FAA, in their style of management, wanted to see all of the people. So, in a sense, there is no shared resource of any kind.

In our overhead pool, we have a building that we have to pay the rent on. We have the normal care and feeding of our people. But as far as indirect resources, there are none.

The other risk to the program is our credibility as a major system contractor. We feel that this job is a part of our strategic plan. It allows us to grow our people. We have to do a good job on this job, as we would any other program. So our reputation as a systems engineering contractor and our financial resource that we have invested, we have taken a sizable resource out of our Denver team to apply to this job; it is an investment.

Mr. GLICKMAN. Will you lose money, in the technical sense, if, after the completion of the contract, you receive no fee from the FAA?

Mr. HUDOFF. Yes, sir.

Mr. HURTT. Yes, we would, Mr. Chairman, in the sense that we will have lost money two ways. One is the obvious lost opportunity for the investment of all the people. Two is, literally, we would lose money in that, in our case, once we get a fee—that is, a number above and beyond our literal cost of doing business—that fee has to include a category of unallowables, and that category of unallowables includes things like interest; that is, we do not charge the Government interest for our working capital. So I will say that number generally runs around 2 percent of our overall cost of things.

So if we literally were in the mode of completing the job and getting literally zero, what we call fee, we would truly have a write-down in our books for performance against that.

Mr. GLICKMAN. Now, the contract that has been let, I am just curious, does it provide a reserve in the appropriated funds for your

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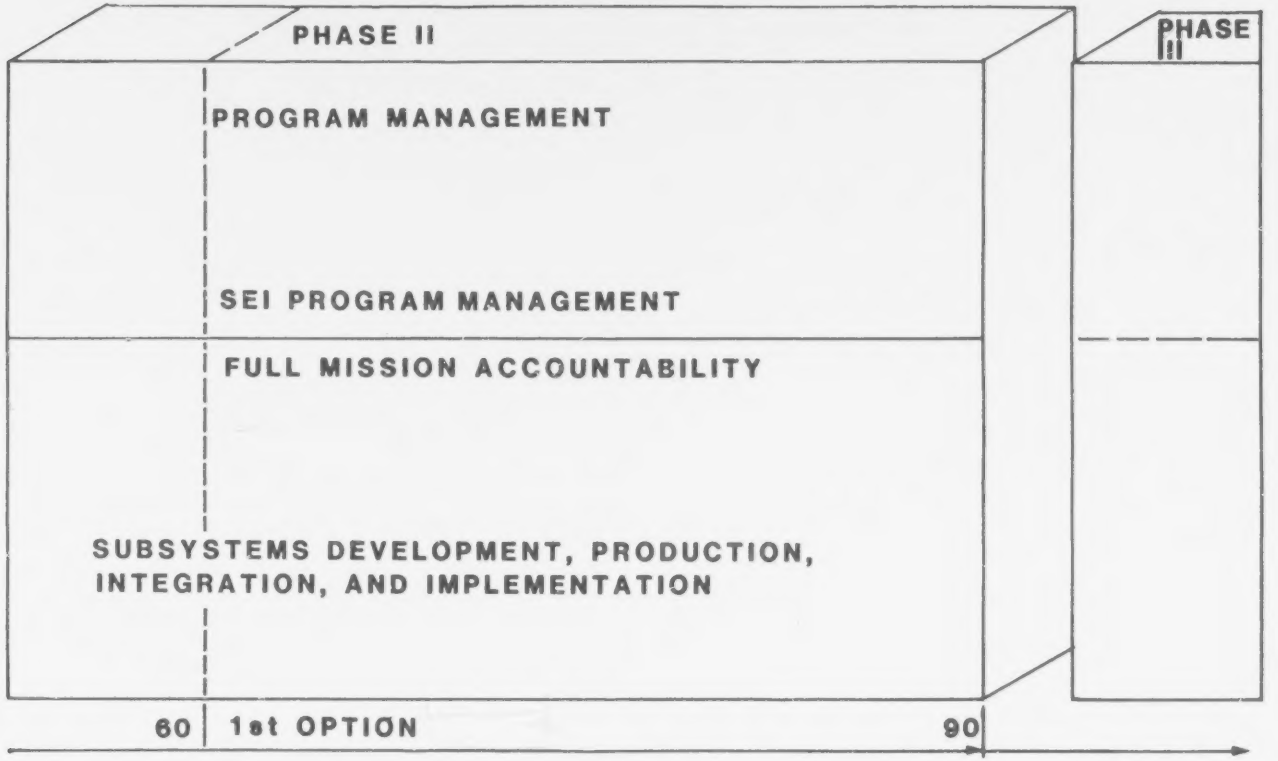
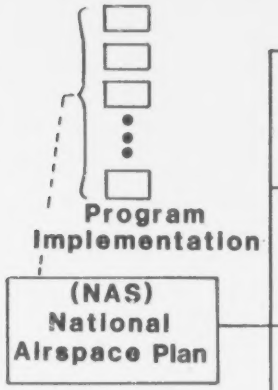


Martin Marietta, Air Traffic Control Division

Systems Engineering Approach



Requirements

- Provide Services to User
- Provide Agency Needs

Level I Allocation

- Define Comprehensive NAS Architecture
- Allocation of Functions to Facilities and Equipment

Level II Topology

- Define the NAS in Terms of Actual ATC Facilities
- Define Functional Strings and Interfaces
- Define System Performance Requirements
- Provide a System Topology

Level III Transition

Integration & Test

- Identify Implementation Packages
- Define Interim NAS Configurations
- Determine Integration, Testing, Training, and Logistics Requirements
- Define Interim NAS Topologies

Level IV Site Design

Implementation & Test

- Develop Site Designs
- Develop Site Specific Plans
  - Test
  - Training
  - Logistics

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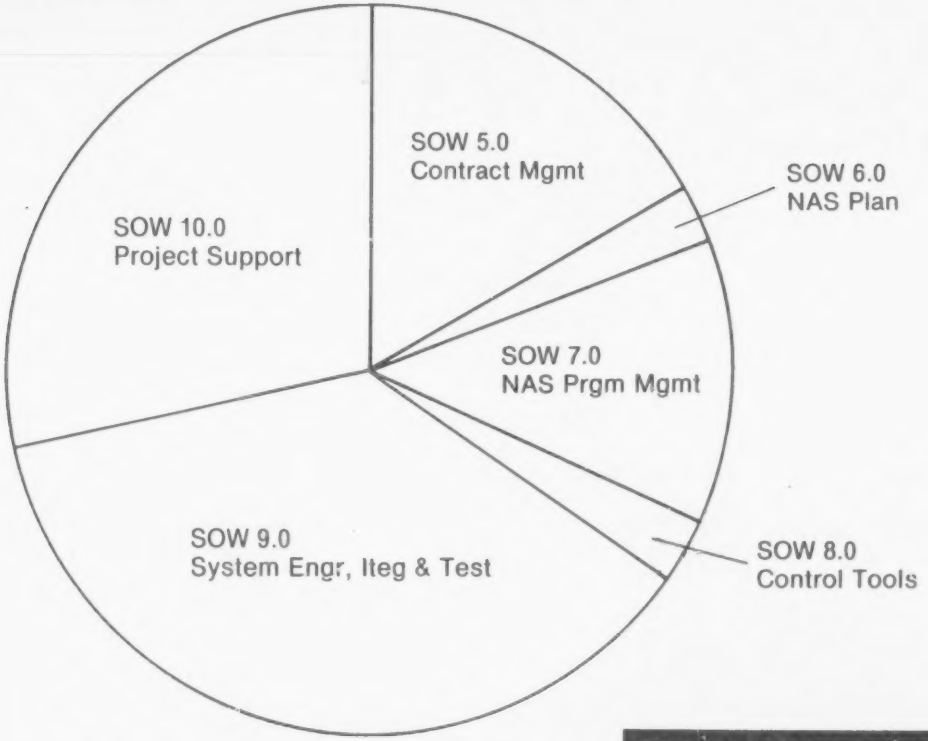
Manpower Distribution



MARTIN MARIETTA

Martin Marietta, Air Traffic Control Division

Fast Start = "Mission Success"

- Audit
- Level I and II Design
- IV&V
- A&E
- Project (Program) Management
- Program Control Tools

MARTIN MARIETTA

Current Status

- Transition
  - — ATC/SEI Headquarters Mobilized
  - — Transition Briefings to SEI Services Complete
  - — Liaison Agreements with FAA Contractors Initiated
- Preliminary Plans Complete
  - — Contract Management Plan
  - — Program Plan
- Audits in Process
  - — 1985 NAS Plan
  - — Level I Design
- Level II and III Design Approach Underway
- Staffing of NAS Plan Current Projects in Progress

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NAS Plan Implementation

- Commitment
- Capability
- Cooperation

MARTIN MARIETTA

fee? What I am trying to say is, how much was the contract, $600-and-some-odd million?

Mr. HURTT. $684 million.

Mr. GLICKMAN. All right. Now, that $684 million, does that include any part of a fee? How much fee is included in that $684 million figure?

Mr. HUDOFF. The planning number that is in our contract structure is a potential award fee of 12 percent.

Mr. GLICKMAN. Of 12 percent, or $140 million or whatever that number happens to be.

Now, let me ask you this: Are there objective criteria in the contract by which your fee is actually tied to success?

Mr. HUDOFF. In the contract structure with the FAA, there is an award fee criteria, a structure by which the FAA and the team that they have set up to essentially evaluate our performance across the entire FAA management team, it is within a structure that grades us for our performance, and as such, while we say that an award fee is subjective in nature, we have worked in the DOD environment on many award fee programs. We find that an award fee structure of the nature that is in our contract is a challenge to us for excellence. If we make an A, in a sense, we get a good fee.

Mr. GLICKMAN. But there is some form of objective performance standards so that it is not so illusory that neither could the FAA say you don't deserve a dime nor could you say we deserve the whole thing, and the FAA's standards are wrong. I want to insure that the Government is adequately protected on that side of the picture, and you are as well.

Mr. HUDOFF. Well, I would say that the structure that the FAA has chosen is fairly classical. It is the typical DOD award fee program. It provides for equal protection, if you will. However, the fundamental judgment by the FAA is one based on our performance, and we have to accept the fact that there is a certain element of subjectivity in that. However, with all of our previous customers in the DOD world and in the NASA world, that has been very fair and equitable.

Mr. GLICKMAN. We all agree that it is none too soon to begin your task, but there is a heavy backlog of catchup work. How soon do you think that you will be able to catch up and be working in real time?

Mr. HUDOFF. As I showed in the transition plan, I believe that we are engaged now. However, the real output, the real maturity level, the first checkpoint, if you will, is at the completion of the audit, both the design audit of the level I design that the FAA has, and the audit of the NAS plan.

That point was chosen as a major milestone by the FAA and us. It says that in 6 months this contractor has made his mark on the NAS plan, and that from that point on, we should be running at flank speed as they are currently doing.

Mr. GLICKMAN. You, I think, touched upon this when I was absent from the hearing, about delineating the boundaries of your technical directions, so referred to, and we have heard it from the FAA as well.

I am still somewhat concerned about that, how you interrelate for the FAA. For instance, who conducts and signs off on customer design reviews or hardware buys for the Government, SEI or FAA?

Mr. HUDOFF. Let me take the latter because there is no question that the FAA has the sole responsibility for a buyoff of an associate contractor or a system and subsystem contractor's hardware. The contracting agent is the FAA, and therefore they cannot delegate that responsibility in a contract sense to anyone. So buyoff of hardware within the contract structure that the FAA has is clearly an FAA responsibility.

However, as a part of our role, which is the technical arm, we would advise and counsel the FAA, based on our analysis, review of data, compatibility analysis of one piece of hardware versus another; we would advise the FAA program manager at the point of buyoff.

In addition, the FAA has a contract structure, a quality assurance organization, that is an equal part of seeing that that hardware progress has been made according to the specifications. I would say there is no question that the FAA is the sole responsibility.

Now, to try to deal with clarifying the tech direction role—and as Jerry Ebker had said earlier, from IBM—we have operated in this environment on a number of our programs. In fact, Aerospace Corp. is a company that deals with technical direction as a part of its support to the Air Force. I personally have dealt in that environment before.

Consequently, it is an environment that must be created in a nonadversarial way; a confidence-building role between our technical support arm and the FAA program manager; and it deals with issues within the scope of the contract; it deals with interpretation.

Mr. GLICKMAN. For example, on page 6 of your testimony, you refer to your role of technical director to select system and subsystem contractors. The question is, What can the FAA and their prime contractors do in this regard, and does this mean they are abrogating their role? Plus, we have some Federal procurement standards, A-109 and others, that require the Federal Government to not be able to abrogate or totally delegate their responsibilities.

Mr. HUDOFF. Let me clarify that statement. The intent of the statement was to identify that as part of the evolution of the design from its current state to its maturity, part of the analysis that we will do will print out, potentially point out, the need for new systems.

If the current design has an incompatibility in it, by analysis you find that incompatibility. There is a choice of how that problem gets solved. And in that sense, we, the SEI contractor, would make a recommendation to the FAA as to how to solve that problem. It may require a new subsystem or a new box.

In that sense, and within the structure, the FAA has the authority totally to go out and contract based on their acceptance of our recommendation to solve that particular problem. They have not in any way abrogated their role, and I apologize if that statement was misinterpreted.

Mr. GLICKMAN. How would you characterize your state of knowledge about the air traffic control system?

Mr. HUDOFF. Personally, I fly a lot, and, unfortunately, when you fly, you don't know, as the lay person, all of the things that are involved in the process below you.

However, we studied this program for 3 years. We have a number of people that we brought with us that were part of that fundamental team. Our state of knowledge is one that the system in place today seems to support our needs. The system in the future has a number of problems that it is faced with that must be resolved.

My personal state of knowledge and the knowledge of our team is based on 3 years of work. We are in a transition mode now to take over more and more of our contract responsibilities. I would say that my knowledge of the FAA and the knowledge of our team is one of understanding and challenge to aggressively pursue the current issues involved in today's air traffic control system.

Mr. GLICKMAN. You mentioned in the statement that yearly updating of the NAS plan was turned over to the SEI contractor. Do you know why? That would seem to be a function of the FAA, a planning function of the FAA.

Mr. HUDOFF. It is, and they have retained that. The statement in our contract structure is one of the programmatics of constructing the document, issuing the document; however, that is the FAA's primary plan; that is their contract relationship, essentially, with the Congress, and as such, we are their arms and legs, if you will, to deal with that document.

Mr. GLICKMAN. We appreciate your testimony today and look forward to working with you in the future.

Mr. HUDOFF. Thank you.

Mr. HURTT. Thank you, Mr. Chairman.

Mr. GLICKMAN. The hearing is adjourned.

[Whereupon, at 10:55 a.m., the subcommittee recessed, to reconvene at the call of the Chair.]

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